

Government of West Bengal Office of the Principal

GOVERNMENT GENERAL DEGREE COLLEGE, KESHIARY

At.-Telipukur : P.O.- Tilaboni Mahisamura : P.S.- Keshiary Dist- Paschim Medinipur : PIN-721135 www.ggdckeshiary.ac.in

Criteria 1: Curricular Aspects

1.1. Curricular Planning and Implementation

1.1.1. The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

Contents

Institute curriculum planning

Institute has effective curriculum planning in a well-planned documented process for each and every Subject.

Bengali Anthropology

English Botany

Santali Chemistry

History Zoology

Political Science



Officer-in-Charge Govt. Gen. Degree College Keshiary

Curriculum Plan AY 2022-2023 CBCS

BENGALI: Honours & General

(ODD SEMESTER)

Semes	ster I Hons	Period: 19.09.22	09.22 to 04.02.23		3
Paper	:- C-1,C-2,GE-1	GE-1 Full Marks: 75,75,75 Credit:6,6,6			
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	C -1: বাংলা ভাষার উদ্ভব ও পরিচ্য়		40	Dr.Monua Panja	
2	C-2 বাংলা সাহিত্যের ইতিহাস (প্রাচীন ও মধ	उयूरा)	40	Ashok Das	
3	GE-1 বাংলা ভাষার বিভিন্ন স্তর ও বাংলা ভাষ	मा हिंदा	40	Dr.Monua Panja	

Semes	ster I General	Period: 19.09.22	to 04.02.23		.23
Paper	- DSC-1A/DSC-2A	Full Marks: 75	Credit: 6		
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	DSC-1A/DSC-2A বাংলা সাহিত্যের ইতিহাস	ও বাংলা ভাষাতত্ব	40	Ashok Das	

Semes	ter III Hons	Period: 09.09.22		to 21.01.2	3
Paper	- C-5,C-6,C-7,SEC-1,GE-3	Full Marks: 75,75,75	5,50,75 Cre	edit: 6,6,6,2	6
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	C-5 উনিশ-বিশ শতকের প্রবন্ধ ও কাব্য সাহি আখ্যান সাহিত্য পাঠ	ত্ত্যের ইতিহাস এবং	40	Ashok Das	
2	C- 6 ছন্দ – অলঙ্কার ও নির্বাচিত কবিতা পা	8	40	Dr.Monua Panja	
3	C- 7 প্রবন্ধ সাহিত্য পাঠ		40	Ashok Das	
4	SEC-1 বাংলা ব্যাকরণ ও অনুবাদতত্ব		30	Dr.Monua Panja	
5	GE-3 উপন্যাস ও ছোটগল্প পাঠ		40	Dr.Monua Panja	

Semester III General Period: 09.09.22 to 21.		to 21.01.	.23		
Paper	- DSC-1C/DSC-2C,SEC-1	Full Marks: 75,50	Credit: 6,2		,2
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	DSC-1C/DSC-2C বাংলা কথাসাহিত্য, নাটক ও প্রবন্ধ		40	Ashok Das	
2	SEC-1 লিখন নৈপুণ্য বৃদ্ধি		30	Ashok Das	

Semes	ter V Hons	Period: 16.08.22		to 23.12.22	2
Paper	- C-11,C-12,DSE-1,DSE-2	Full Marks: 75,75,75	,75 Cre	edit: 6,6,6,6	
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	C-11 নাট্য পাঠ		40	Dr.Monua	
				Panja	
2	C- 12 কাব্যতত্ব, পাশ্চাত্য সাহিত্য সমাণে	ণাচনা-ভত্ব ও সাহিভ্যের	40	Ashok	
	রুপরীত <u>ি</u>			Das	
3	DSE-1 সাহিত্য আন্দোলন, সমালোচনা ও রূপ	রীতি	40	Dr.Monua	
				Panja	
4	DSE-2 বাংলা ছোটগল্প, ভ্রমণ কাহিনি ও গোড়ে	য়ন্দা কাহিনি পাঠ	40	Ashok	
	*			Das	

Semes	ster V General	Period: 16.08.22		to 23.12.22	2
Paper	- DSE-1A/DSE-2A,GE-1,SEC-3	Full Marks: 75,75,5	0	Credit: 6,6,2	
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	DSE-1A/DSE-2A রবীন্দ্রনাথ		40	Dr.Monua Panja	
2	GE-1 শিশু সাহিত্য ও গোয়েন্দা কাহিনি		40	Ashok Das	
3	SEC-3 শৈলী, কাব্যশৈলী বিচার, গদ্যশৈলী ও	নাট্যশৈলী বিচার	30	Dr.Monua Panja	

(EVEN SEMESTER)

Semes	ster II Hons	Period: 20.03.23		to 28.07.23	3
Paper	:- C-3,C-4,GE-2	Full Marks: 75,75,75	5	Credit: 6,6	,6
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	C-3 প্রাচীন ও মধ্য যুগের পদ পাঠ		40	Dr.Monua Panja	
2	C-4 চৈত্তন্য জীবনী ও মঙ্গলকাব্য সাহিত্য পার্ટ	5	40	Ashok Das	
3	GE-2 কাব্য সাহিত্যের ধারা ও বৈষ্ণব পদাবর্ল	নী পাঠ	40	Ashok Das	

Semes	eter II General	Period: 20.03.23	23 to 28.07.23		23
Paper	- DSC-1B/DSC-2B, AECC MIL-1	Full Marks: 75,75	75 Credit: 6, 6		
Sl. No.	PAPER		CLASSES	Class taken	Remark
			ALLOTED	by	
1	DSC-1B/DSC-2B কাব্য-কবিতা		40	Dr.Monua	
				Panja	
2	AECC MIL-1 কবিতা ও ছোটগল্প		40	Dr.Monua	
				Panja	

Semester IV Hons		Period: 28.02.23		to 08.07.23	
Paper-	· C-8,C-9,C-10,SEC-2,GE-4	Full Marks: 75,75,75	,50,75 Cro	edit: 6,6,6,2,0	6
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	C-8 উনিশ-বিশ শতকের প্রবন্ধ ও কাব্য ফ আখ্যান সাহিত্য পাঠ	নাহিত্যের ইতিহাস এবং	40	Ashok Das	
2	C-9 কাব্য পাঠ		40	Ashok Das	
3	C-10 উপন্যাস পাঠ		40	Dr.Monua Panja	
4	SEC-2 বাংলা ভাষা ও সাহিত্য বিষয়ক প্রকল্প উপস্থাপনা	রচনা ও প্রকল্প	30	Dr.Monua Panja	
5	GE-4 বাংলা গীতি সাহিত্য, শিশু সাহিত্য ও র	ন্স্য রচনার ধারা	40	Ashok Das	

Semes	ter IV General	Period: 28.07.23		to 28.07.	23
Paper	- DSC-1D/DSC-2D,SEC-2,AECC	Full Marks: 75,50,75 Credit: 6,2,6			
Sl. No.	PAPER		CLASSES	Class taken	Remark
			ALLOTED	by	
1	DSC-1D/DSC-2D সাহিত্য তত্ব ও সাহিত্য	নিৰ্মাণ কলা	40	Dr.Monua	
				Panja	
2	SEC-2 বাংলা ধ্বনি তত্ব ও রূপ তত্ব		30	Dr.Monua	
				Panja	
3	AECC Bengali-2 উনিশ শতকের বাংলা প্রব	বন্ধ ও লোকসাহিত্য	40	Dr.Monua	
	•			Panja	

Semes	ster VI Hons	Period: 06.02.23	06.02.23 to 14.06.23		3
Paper	r- C-13,C-14,DSE-3,DSE-4	Full Marks:75,75,75	,75 Credi	t: 6,6,6,6	
Sl. No.	PAPER	•	CLASSES ALLOTED	Class taken by	Remark
1	C-13 লোকসাহিত্য		40	Dr.Monua Panja	
2	C-14 সংস্কৃত, ইংরেজি ও প্রতিবেশী সাহিত্যে	ব ইতিহাস	40	Ashok Das	
3	DSE-3 গদ্য সাহিত্য পাঠ		40	Dr.Monua Panja	
4	DSE-4 রবীন্দ্র সাহিত্য পাঠ		40	Ashok Das	

Semes	ster VI General	Period: 06.02.23		to 14.06.2	23
Paper	-DSE-1B/DSE-2B,GE-2,SEC-4	Full Marks: 75,75,50) Cred	lit: 6,6,2	
Sl. No.	PAPER		CLASSES ALLOTED	Class taken by	Remark
1	DSE-1B/DSE-2B উপন্যাস ও ছোটগল্প		40	Dr.Monua Panja	
2	GE-2 প্রবন্ধ ও সাহিত্যের রূপরীতি-বিচার পদ্ধতি		40	Ashok Das	
3	SEC-4 বিষয় ভিত্তিক আলোচনা ও আলোচন	াপত্ৰ উপস্থাপন	30	Dr.Monua Panja	

Teaching Plan (EVEN SEMESTER)

(English Honours; CBCS)

Semo	ester II (AY 2023-2024)	Period Feb	,2023 to	July,2023	
Pape	r: CC 3 British Drama	Full Marks:	75	Credit:06	
and 1	Prose (Renaissance to				
18 th	century)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	British Drama and Prose		40	Saranya	
				Mukherjee	

Semo	ester II (AY 2023-2024)	Period Feb,2	2023 to]	July,2023	
Paper: CC 4 (: British		Full Marks:	75	Credit:0)6
Litera	ature: Romantic Period				
) (Th	ieory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
2			40	Dr.Md	
	British Literature : Romantic Period			Ataur	
				Rahaman	

Semo	Semester II (AY 2023-2024) Period Feb,2023 to July,2023				
Pape	er: GE 2 Gender and	Full Marks:	75	Credit:06	
Hum	an Rights				
Sl.	Paper/Topic	;	CLASSES	Class	Remark
No.			ALLOTED	taken by	
3	Gender and Human Rights	5	40	Saranya	
				Mukherjee	

Teaching Plan (EVEN SEMESTER) (English Honours; CBCS)

Semester IV (AY 2023-2024)	Period Feb	,2023 to	July,2023	
Paper: CC8 European	Full Marks: 75 Credit:06			6
Classical Literature				
) (Theory)				
Sl. Paper/Top	Paper/Topic		Class	Remark
No.		ALLOTED	taken by	

1	European Classical Literature	40	Saranya
			Mukherjee

Semo	Semester IV (AY 2023-2024) Period Feb,2023 to July,2023				
Pape	er: CC9(Modern	Full Marks:	75	Credit:0)6
Euro	pean Drama) (Theory)				
Sl.	Paper/Topio	;	CLASSES	Class	Remark
No.			ALLOTED	taken by	
2			40	Dr.Md	
	Modern European Drama			Ataur	
				Rahaman	

Semester IV (AY 2023-2024)		Period Feb,	,2023 to	July,2023	
Pape	r: CC10 (Popular	Full Marks:	75	Credit:0	6
litera	ture)				
(The	ory)				
Sl.	Paper/Topio	;	CLASSES	Class	Remark
No.			ALLOTED	taken by	
3/A			20	Saranya	
				Mukherjee	
	Popular Literature(Topic:	Funny Boy,			
	Abol Tabol)				
3/B	Popular Literature(Topic:	Through		Dr.Md	
	the Looking Glass, The Mu	•	20	Ataur	
	Roger Ackroyd)			Rahaman	

Semo	ester IV (AY 2023-2024)	Period Feb	,2023 to	July,2023	
Pape	er: SEC2 Business	Full Marks: 50		Credit:0)2
Com	munication)				
(The	ory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
4	Business Communication		40	Saranya	
				Mukherjee	

Teaching Plan (EVEN SEMESTER) (English GE CBCS)

Semester IV (AY 2023-2024)		Period Feb,	2023 to	July,2023	
Pape	er: GE4(Environment	Full Marks:	75	Credit:()6
and I	iterature) (Theory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
5			40	Dr.Md	
	Environment and Literatur	e		Ataur	
				Rahaman	

Teaching Plan (EVEN SEMESTER) (English Honours; CBCS)

Seme	ester VI (AY 2023-2024)	Period Feb	,2023 to	July,2023	
Paper: CC13 T :Indian classical Litersature) (Theory)		Full Marks:	75	Credit:0	6
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1/A			26	Saranya	
	Indian Classical Literature: Abhijnana Shakuntalam and Vyasa's The DicingThe Temptation of Karna, Book V)			Mukherjee	

1/B		14		
	Sudraka's 'Mrcchakatika'		Dr.Md	
			Ataur	
			Rahaman	

Seme	ester VI (AY 2023-2024)	Period: July,2023	J	Feb,2023	to
Paper: CC14T Indian Writing		Full Marks:	75	Credit:0	6
in En	iglish) (Theory)				
Sl.	Paper/Topio	;	CLASSES	Class	Remark
No.			ALLOTED	taken by	
2/A			26	Dr.Md	
				Ataur	
	Poetry and fiction			Rahaman	
2/B	Drama		14		
	•			Saranya	
				Mukherjee	

Seme	ester VI (AY 2023-2024)	Period:	I	Feb,2023	to
		July,2023			
Pape	er: DSE3 (Science	Full Marks:	75	Credit:0	6
Fictio	on and Detective				
Litera	ature) (Theory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
3			40	Saranya	
	Science Fiction and Detect	tive		Mukherjee	
	Literature				

Sem	ester VI (AY 2023-2024)	Period Feb,2	2023 to J	uly,2023	
Pape	er: DSE4 (Partition	Full Marks: 75 Credit:06			
Liter	ature) (Theory)				
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
4			40	Dr.Md	
	Partition Literature			Ataur	
				Rahaman	

Curriculum Plan (ODD SEMESTER) (English Honours; CBCS)

Sem	ester I (AY 2022-2023)		Perio	od :July,2022	to Jan 2023	
					T	
Sl. No.	Paper/Topic			CLASSES ALLOTED	Class taken by	Remark
1	CORE 1T: British Poetry and Drama:	3eginn	ing	40	Saranya	
	to 14th C and History of Eng Language	e F.M:	75,		Mukherje	
	Credit: 06				е	
2	CORE 2T: British Poetry and Dram	na:		40	Dr. Md	
	Renaissance to 17th and 18th centur	ries, F.	M.		Ataur	
	75, Credit: 06				Rahaman	
3.	AECC Elective, F.M. 50, Credit: 02			20	Dr. Md	
					Ataur	
					Rahaman	
4.	AECC Core, F.M. 50, Credit:02			20	С	
5.	GE-1 Academic Writing and Compo	osition	1,	40	Dr. Md	
	F.M75, Credit 06				Ataur	
		1			Rahaman	
Sem	ester III (AY 2022-2023)	Perio	od Jul	y,2023 to	January,202	23
Sl.	Paper/Topic			CLASSES	Class	Remark
No.	. , .			ALLOTED	taken by	
1	CC 5T: British Literature 19th Century	1		40	Dr. Md	
					Ataur	
					Rahaman	
2	CC6T:British Literature : Early 20th	ı		20	Dr. Md	
	Century: Poetry Section:				Ataur	
					Rahaman	
3	CC6T:British Literature : Early 20th	ı			Saranya	
	Century: Fiction			20	Mukherje	
		Г		191000	e	
	ester III (AY 2023-2024)			od Feb,2023	to July,20	
•	er: GE 3 T Contemporary India: Wome	en	Full	Marks: 75	Cr	edit:06
allu	Empowerment					

	Paper/Topic	CLASSES Class		Remark
		ALLOTED	taken by	
4	GE 3 T Contemporary India: Women and Empowerment	40	Saranya Mukherje e	
5	SEC: 1: Soft Skills, F.M. 50, Credit: 02	20	Dr. Md Ataur Rahaman	

Curriculum Plan (ODD SEMESTER) (English Honours; CBCS)

Semo	ester V (AY 2023-2024)	Peri	od Fe	b,202	23 to J	uly,2023	
Sl. No.					SSES OTED	Class taken by	Remark
1	CORE 11T:Postcolonial Literature, F. Credit: 06	M.75,		40		Saranya Mukherje e	
Semo	ester V (AY 2023-2024)		Peri	od Fe	b,2023	to July,20	023
•	er: CORE 12T Women's Writing neory)		Full	Mark	s: 75	Cr	edit:06
Sl. No.	Paper/Topic				CLASSE S ALLOTE D	taken	Remark
2	Women's Writing				40	Dr. Md Ataur Raham an	
Semo	ester V (AY 2023-2024)	Peri	od Fe	b,202	23 to J	uly,2023	
•	er: DSE 1T (19th Century European sm) (Theory)	Full	Mark	s: 75	5	Credit:()6

Sl. No.	Paper/Topic		CLASSES ALLOTED	Class taken by	Remark
3/ A	3/ Crime and Punishment		20	Saranya Mukherje	
3/ B	Madam Bovary		20	Dr Md Ataur Rahaman	
Sem	ester V (AY 2023-2024)	Peri	od Feb,2023	to July,20)23
Pape	er:DSE:2T (World Literatures)	Full	Marks: 75	Cr	edit:06
(The	eory)				
Sl. No.	Paper/Topic		CLASSES ALLOTED	Class taken by	Remark
4/ Bend in the River by Naipal A			20	Saranya Mukherje e	
4/ B	Blow up, Bora Ring		20	Dr. Md Ataur Rahaman	

Curriculum Plan (Even SEMESTER) (English Gen; CBCS)

Sem	ester II (AY 2023-2024)	Period: Feb,2023 to Ju			ıly,2023		
Core	Core 3(DSC 1B): Essay, F.M.75, Credit 06						
Drama and Novel							
Sl.	Paper/Topio	;		CLASSES	Class		Remark
No.				ALLOTED	taken by	7	
1	Core-3 (DSC-1B) : Essay, Drai	na		15	Dr.Md		
					Ataur		
					Rahama	n	
2	Core-3(DSC- 1B) : Novel			10			
					Sarany	a	
					Mukherj	jee	

Curriculum Plan (Even SEMESTER) (English Gen; CBCS)

Semester IV (AY 2023-2024)		Period:	Feb,	2023 to J	uly,2023
)					
Sl. No.	Paper/Top	pic	CLASSES	Class	Remark
			ALLOTED	taken by	
1	Core-7 (DSC-1D) Academi	_	20	Dr.Md	
	Composition : Theory (F.N	1.75, Credit		Ataur	
	06)			Rahaman	
2	SEC- 2 : Technical Writing	(F.M.50,	16	Saranya	
	Credit 02)			Mukherjee	

Curriculum Plan (Even SEMESTER) (English Gen; CBCS)

Semester VI (AY 2023-2024)		Period:	Feb,2	2023 to Ju	ıly,2023
Paper: DSE-1B / 2B (Modern		Full Marks:	75	Credit: (06
Europe) (Th	eory)				
Sl. No.	Paper/To	pic	CLASSES	Class	Remark
			ALLOTED	taken by	
1	DSE: 2: Partition Literature (Theory)		25	Dr.Md	
	FM.75, Credit 06			Ataur	
				Rahaman	
2	GE- 2 : Environment and		16	Dr.Md	
	(Theory) F.M.75, Credit 0	16		Ataur	
				Rahaman	
3	SEC- 4: Business Commu	nication ,	16	Saranya	
	(F.m.50, Credit 02)			Mukherjee	

Teaching Plan (Odd SEMESTER) (English Gen; CBCS)

Sem	Semester I (AY 2023-2024)		July,	,2022	to Ja	an, 2023
Sl.	Paper/Topio	•	(CLASSES	Class	Remark
No.			A	ALLOTED	taken by	
1	Core-1(DSC-A)/Core-2 (I		2	25	Saranya	
	Poetry and Short Story. F.M75, Credit-06				Mukherjee	
2	AECC-1(Language Core)	F.M75,	1	16	Dr. Md	
	Credit-06				Ataur	
					Rahaman	
3	AECC-1(Elective)) F.M75	, Credit-06	1	10	Dr. Md	
					Ataur	
					Rahaman	

Teaching Plan (Odd SEMESTER) (English Gen; CBCS)

Semester	III (AY 2023-2024)	Period : Jul	ly,2022	to Ja	an, 2023
Sl. No.	Paper/Top	pic	CLASSES	Class	Remark
			ALLOTED	taken by	
1			30	Saranya	
	DSC-1C			Mukherjee	
	Contemporary India: Won	nen and			
	Empowerment (F.M.75, C	Credit 06)			
2.	SEC- 1 Soft Skills (F.M. 50/	Credit: 02)	15	Dr. Md	
				Ataur	
				Rahaman	
3.	AECC-3(Language Core) (I	F.M.75, Credit	20	Dr. Md	
	06)			Ataur	
				Rahaman	

Teaching Plan (Odd SEMESTER) (English Gen; CBCS)

Semester V (AY 2023-2024)	Period: 2023	July,2022	to Jan,

Sl. No.	Paper/Topic	CLASSES	Class	Remark
		ALLOTED	taken by	
1	DSE 1-A British Literature	25	Saranya	
	F.M.75, Credit-06		Mukherjee	
2	GE- 1 Academic Writing and	16	Dr.Md	
	Composition		Ataur	
	F.M.75, Credit 06		Rahaman	
3	SEC- 3 : English Language Teaching	16	Dr. Md	
	F.M.50, Credit 02		Ataur	
			Rahaman	

Curriculum Plan (ODD SEMESTER)

(Santali Honours; CBCS)

Semes	ster I (AY 2022-2023)	Period: 19 Septemb	er,2022 t	o 4 th Februa	ry 2023	
Paper	: CC1T (History of Santali Literature,	Full Marks: 75	Cr	edit:6		
Ancie	nt Literature Before 1845 A.D.)					
(Theo	ory)					
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	Origin of Santali Literature.		40			
				Shyamali		
				Majhi		
Seme	ester I(AY 2022-2023)	Period: 19 Septemb	er,2022 t	o 4 th Februa	ry 2023	
Paper	: CC2T (Austric Language Family &	Full Marks: 75	Cr	edit:6		
Santa	li) (Theory)					
Sl. No.	No. PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	Origin and Development of Santali Lang	guage.	40	Dr. Shila		
				Baske		

Curriculum Plan (ODD SEMESTER)

(Santali General; CBCS)

	(== == , = ==,						
Seme	ster I (AY 2022-2023)	Period: 19 September, 2022 to 4th February 202			ry 2023		
Paper – DSC-1A History of Santali Literature Full Marks: 75 Credit:6							
(Theo	ory)						
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark		
1			8	Dr. Shila Baske			
2	Important Author		8	Shyamali Majhi			
3	Important Books		8	Shyamali Majhi			
4	Magazines & Journals		8	Dr. Shila Baske			
5	Missions & Missionaries.		8	Dr. Shila Baske			

Curriculum Plan (ODD SEMESTER) (Santali Honours; CBCS)

Semes	ster III (AY 2022-2023)	2022-2023) Period: 9th September, 2022 to 21st January				ıary
Paper	CC5T: Functional Grammar of Santali	T: Functional Grammar of Santali Full Marks: 75 Credit:6			dit:6	
Langu	age (Theory)					
Sl. No.	PAPER/ TOPICS			CLASSES ALLOTED	Class	Remark
					taken by	
1				40	Shila	
	Paper CC5: Functional Grammar of Santali Language				Baske	
	_					

Semester III (AY 2022-2023) Period: 9th September, 2022 to 21st January					ıary	
Paper 2(The	CC6T: Santali Folk Literature &Culture- ory)	Full Marks:	75	Cre	edit:6	
Sl. No.	PAPER/ TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Paper CC6: Santali Folk Literature &Cult	ure-2		40	Dr.	
					Shila	
					Baske	

Semester III (AY 2022-2023) Period: 9th September, 2022 to 21st January					
Paper	CC7:History of Santali Modern	Full Marks: 75 Credit:6			
Litera	ture				
(Theo	ry)				
Sl. No.	PAPER/ TOPICS		CLASSES		Remark
			ALLOTE) by	
1			40	Shyamali	
	Paper CC7:History of Santali Modern Literature			Majhi	

Semes	ster III (AY 2022-2023)	Period: 9th September, 2022 to 21st January			
Paper	SEC1: Creative Writing (Theory)	Full Marks: 50 Credit:2			
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	SEC1: Creative Writing		35	Shyamali	
				Majhi	

Curriculum Plan (ODD SEMESTER)

(Santali General; CBCS)

Semes	ster III (AY 2022-2023)	Period: 9th September, 2022 to 21st January			
Paper	: DSC1C: Drama Literature (Theory)	Full Marks:75			
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Drama i. Darege Dhon, ii. Bir Birsha,		15	Shyamali Majhi	
2	Drama i. Lo Bir, ii. Sidhu Kanhu Hool,		15	Dr. Shila Baske	
3	i. Koche karba, ii. Maya Sutam (one act play)		5	Shyamali Majhi	
4	i. Sirjin (one act play)			Dr. Shila Baske	
Semes	ster III (AY 2022-2023)	Period: 9th Septemb	er, 2022 t	to 21st Janua	iry
SEC1:	: Creative Writing (Theory)	Full Marks: 50	Cre	edit:2	
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Creative Writing - Creative Writing, Art and Craft of writing, Models of Creative writing		17	Dr. Shila Baske	
2	Creative Writing – Writing of media, prepublication.	paring for	17	Shyamali Majhi	

Curriculum Plan (ODD SEMESTER)

(Santali Honours; CBCS)

Semes	ster V (AY 2022-2023)	Period: 16th August, 2022 to 23rd December			oer
CC11:	Novel & Short Story (Theory)	Full Marks: 75	75 Credit:6		
Sl. No.	PAPER/ TOPICS		CLASSES	Class taken	Remark
			ALLOTED	by	
1			40	Shyamali	
	CC11: Novel & Short Story			Majhi	
	•				

Seme	ster V (AY 2022-2023)	Period: 16th August, 2022 to 23rd December			
CC 12	2: Poetry Literature (Theory)	Full Marks: 75	Credit:6		
Sl. No.	PAPER/ TOPICS	<u>I</u>	CLASSES ALLOTED	Class taken by	Remark
1	CC 12: Poetry Literature		40	Dr. Shila Baske	

Seme	ster V (AY 2022-2023)	Period: 16th August, 2022 to 23rd December						
Paper	: DSE1: Decretive study of Santali	Full Marks: 75 Credit:6						
Langu	Language (Theory)							
Sl. No.	TOPICS		CLASSES	Class taken	Remark			
			ALLOTED	by				
1			40	Shyamali				
	DSE1: Decretive study of Santali Langua	age		Majhi				
				,				

Seme	nester V (AY 2022-2023) Period: 16th August, 2022 to 23rd December					ber
DSE2	: Poem & Poetry of Literature (From	Full Marks:	75	Cre	dit:6	
1950 to Till Now) (Theory)						
Sl. No.	PAPER/ TOPICS			CLASSES	Class	Remark
				ALLOTED	taken by	
1	DSE2: Poem & Poetry of Literature (From 1950 to Till Now)			40	Dr.Shila	
					Baske	

Curriculum Plan (EVEN SEMESTER)

(Santali Honours; CBCS)

Semester II (AY 2022-2023)			Period: 20 TH March, 2023 to 28 th July, 2023						
Paper:	: CC3T	(Paper	CC3:	Santali	folk	Full Marks: 75 Credit:6			
literature-1) (Theory)									
Sl. No.			F	PAPER/ TO	PICS		CLASSES	Class taken	Remark
							ALLOTED	by	
1							40	Shyamali	
	Paper CC3: Santali folk literature-1						Majhi		
	1							,	
							1		

Semes	ster II (AY 2022-2023)	Period: 20 TH March, 2023 to 28 th July, 2023				
Paper	CC4 :History of Santali literature	Full Marks: 75	Cre	edit:6		
(Medi	eval period: 1845 – 1947)(Theory)					
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1			40	Dr.Shila		
1			10	Baske		
	Paper CC4 :History of Santali literatu 1845 – 1947)	re (Medieval period:				

Curriculum Plan (EVEN SEMESTER)

(Santali General; CBCS)

Semes	ster II (AY 2022-2023)	Period: 20 TH	March,	2023 to	28th July, 20	23
Paper	: DSC-1B: Santali Poetry Literature,	Full Marks: 75 Credit:6				
Folk Song (Theory)						
Sl. No.	PAPER/ TOPICS			CLASSES	Class taken	Remark
				ALLOTED	by	
1	Santali Poetry			20	Dr. Shila	
					Baske	
2	Folk Song			20	Shyamali	
					Majhi	

Curriculum Plan (EVEN SEMESTER)

(Santali Honours; CBCS)

Semes	ester IV(AY 2022-2023) Period: 28th Februay, 2023 to 8th July, 2023				
Paper	: Paper CC8: Language & Santali	Full Marks: 75 Credit: 6			
Linguistic (Theory)					
Sl. No.	PAPER/ TOPICS		CLASSES	Class	Remark
			ALLOTED	taken by	
1			40	Dr.Shila	
	Paper CC8: Language & Santali Linguisti	ic		Baske	

Semes	ster IV(AY 2022-2023)	Period: 28th Februay, 2023 to 8th July, 2023				.023			
Paper	er: CC9T: Comparative Study Tribal Full Marks: 75 Credit:6								
Literat	Literature & Others (Theory)								
Sl. No.	PAPER/ TOPICS			CLASSES	Class	Remark			
				ALLOTED	taken by				
1	CC9: Comparative Study Tribal Literatur	e & Others		40	Dr.Shila				
					Baske				

Semester IV(AY 2022-2023) Period: 28th Februay, 2023 to 8th July, 2023					023		
Paper : CC10 Theory of Literature		Full Marks	s:	75	Credit:6		
Sl. No.	PAPER/ TOPICS				CLASSES	Class taken	Remark
					ALLOTED	by	
1	Paper CC10 Theory of Literature				40	Shyamali	
						Majhi	

Semes	ster IV(AY 2022-2023)	Period: 28th Februay, 2023 to 8th July, 2023				023	
Paper: SEC2: Santali Language Teaching		Full Mark	KS:	50	Credit:2		
Sl. No.	PAPER/ TOPICS				CLASSES	Class taken	Remark
					ALLOTED	by	
1	SEC2: Santali Language Teaching				35	Shyamali	
						Majhi	

Curriculum Plan (EVEN SEMESTER)

(Santali General; CBCS)

Seme	ster IV(AY 2022-2023)	Period: 28th Februa	ay, 2023 t	o 8th July, 20	023
Paper: DSC1D: Santali Novel & Short story		Full Marks: 75	Cr	edit:6	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Santali Novel - Harmawak auto, Kash dungri, Short story – Hirom sikir, Mama Orag.			Shyamali Majhi	
2	Santali Novel - Auto Orak, Upal, Matima Short story – Baj Mudam, Khuni Matko		20	Dr. Shila Baske	

Seme	ster IV(AY 2022-2023)	ay, 2023 to 8th July, 2023			
Paper	:: SEC2: Santali Language Teaching	Full Marks: 50	Cr	edit:2	
Sl. No.	PAPER/ TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Knowing the Learner, structure of Sant of Teaching Santali Language.	tali Language, Method	17	Dr. Shila Baske	
2	Materials for Language Teaching, Asse	ssing Language Skills.	17	Shyamali Majhi	

Curriculum Plan (EVEN SEMESTER) (Santali Honours; CBCS)

Semester VI (AY 2022-2023) Period: 6th February, 2023 to 14th June, 2023					023	
Paper: CC13: Drama & Essay Literature		Full Marks:	75	Credit:6		
Sl. No.	PAPER/ TOPICS			CLASSES	Class taken	Remark
				ALLOTED	by	
1	CC13: Drama & Essay Literature			40	Shyamali	
					Majhi	

Semester VI (AY 2022-2023) Period: 6th February, 2023 to 14th June, 2023					2023	
Paper	: CC14: Santali Magazine & Journal,	Full Marks:	75	Cre	edit:6	
Benga	li Literature					
Sl. No.	PAPER/ TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	CC14: Santali Magazine & Journal, Bengali Literature			40	Dr.Shila	
					Baske	

Seme	ster VI (AY 2022-2023)	Period: 6th Fe	ebruary	, 2023 to	14th June, 2	023
_	: DSE3: Prose Literature (from 1936 to	Full Marks:	75	Cr	edit:6	
1980)						
Sl. No.	Sl. No. PAPER/ TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	DSE3: Prose Literature (from 1936 to 1980)			40	Shyamali Majhi	

Semes	ster VI (AY 2022-2023)	Period: 6th February, 2023 to 14th June, 2023			2023
Paper: DSE4 Project Work		Full Marks:	Credi	t:	
Sl. No.	PAPER/ TOPICS		CLASSES	Class	Remark
			ALLOTED	taken by	
1	DSE4: Project Work		40	Dr.Shila	
				Baske	

Curriculum Plan (EVEN SEMESTER)

(History Honours; CBCS)

Seme	ester II (AY 2023-2024)	Period Feb,2	2023 to J	uly,2023	
Pape	er: CC 3T (Mauryan and	Full Marks:		Credit:	
Gupt	a Empire)				
(The	ory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Alauddin	
	Mauryan and Gupta Empire	е		Seikh	

Semo	ester II (AY 2023-2024)	Period Feb,	2023 to	July,2023	
Pape	er: CC 4T (: Political	Full Marks:		Credit:	
Histo	ory of Early Medieval India				
(600	AD to 1200 AD				
) (Th	neory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Inder	
Political History of Early Me		1edieval		Mukherjee	
	India (600 AD to 1200 AD				

Sem	ester II (AY 2023-2024)	Period Feb,	2023 to	July,2023	
Pape	er: GE 2 T Science and	Full Marks:		Credit:	
Empi	ire				
Sl.	Paper/Topio	;	CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Science and Empire		40	Inder	
				Mukherjee	

Curriculum Plan (EVEN SEMESTER) (History Honours; CBCS)

Semo	ester IV (AY 2023-2024)	Period Feb,2	2023 to	July,2023	
Pape	er: CC8T (Renaissance	Full Marks:		Credit:	
and r	reformation)				
(The	eory)				
Sl.	Paper/Topic	!	CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Alauddin	
				Seikh	
	Renaissance and reformation	on			

Sem	ester IV (AY 2023-2024)	Period Feb,	2023 to	July,2023	
Paper: CC9T (The French		Full Marks:		Credit:	
Revo	lution & Nepoleon				
Bona	parte)				
(The	ory)				
Sl.	Paper/Topio	:	CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Inder	
The French Revolution & N		Nepoleon		Mukherjee	
Bonaparte					

Seme	ester IV (AY 2023-2024)	Period Feb,2	2023 to J	uly,2023	
Pape	er: CC10T (19th Century	Full Marks:		Credit:	
Revo	lutions in Europe				
) (Th	eory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Alauddin	
				Seikh	
	19th Century Revolutions in	n Europe			

Semester IV (AY 2023-2024)	Period Feb,	2023 to	July,2023	
Paper: SEC2T (Colonial	Full Marks:		Credit:	
Science in India: Institutions				
and Practices)				
(Theory)				
Sl. Paper/Topio		CLASSES	Class	Remark
No.		ALLOTED	taken by	
1		40	Inder	
Colonial Science in India:	Institutions		Mukherjee	
and Practices				

Curriculum Plan (EVEN SEMESTER) (History GE CBCS)

Sem	ester IV (AY 2023-2024)	Period Feb,2	2023 to J	uly,2023	
Pape	er: GE4T (History of	Full Marks:		Credit:	
India	n Journalism)				
(The	eory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Alauddin	
	History of Indian Journalism	n		Seikh	

Curriculum Plan (EVEN SEMESTER) (History Honours; CBCS)

Sem	ester VI (AY 2023-2024)	Period Feb,2	2023 to	July,2023	
Pape	er: CC13T (International	Full Marks:		Credit:	
Relat	tions after the Second				
Worl	d War)				
(The	eory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Alauddin	
International Relations afte		er the		Seikh	
	Second World War				

Seme	ester VI (AY 2023-2024)	Period:	Feb,2023		to
		July,2023			
Pape	er: CC14T (Modern	Full Marks:		Credit:	
Natio	onalism in India)				
(The	ory)				
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			40	Alauddin	
				Seikh	
	Modern Nationalism in Ind	ia			

Semester VI (AY 2023-2024)			Period:		Feb,2023	to
			July,2023			
Pape	er: DSE3 (The Russian	Full Marks:		Credit:	
Revo	lution) (Theory)				
Sl.	Paper/Topic			CLASSES	Class	Remark
No.				ALLOTED	taken by	
1				40	Inder	
The Russian Revolution					Mukherjee	

Sem	ester VI (AY	2023-2024)	Period Feb,	2023 to	July,2023	
Pape	er: DSE4 (Pre-colonial	Full Marks:		Credit:	
Sout	h East Asia)				
(The	eory)					
Sl.		TOPICS		CLASSES	Class	Remark
No.				ALLOTED	taken by	
1				40	Inder	
	Pre-colonial South East Asia		sia		Mukherjee	

Curriculum Plan (ODD SEMESTER) (History Honours; CBCS)

Sem	ester I (AY 2022-2023)	Period July,2022		to Jan, 2023	
Pape	r: CC 1T (CT1: Greek	Full Marks:	75	Credit:	06
and l	Roman Historians				
)(The	eory)				
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	New form of inquiry (histo	oria) in	03	Inder	
	Greece in the sixth century	BCE		Mukherjee	
2	Herodotus and his Historie	es	03	Inder	
				Mukherjee	
3	Thucydides: the founder of	f scientific	03	Inder	
	history writing			Mukherjee	
4	Next generation of Greek l	nistorians	03	Inder	
				Mukherjee	
5	Development of Roman		03	Inder	
	Historiographical tradition			Mukherjee	
6	Imperial historians		03	Inder	
				Mukherjee	
7	Historical methods in anci-	ent Rome	04	Inder	
				Mukherjee	

Semester I GE (AY 2022-2023)		Period July,2022		to Jan, 2023	
Pape	er: GE (Theories of the	Full Marks:	75	Credit	: 06
Mod	ern State)				
Sl.	TOPICS	CLA	SSES	Class taken	Remark
No.		ALL	OTED 1	by	
1	The State Definitions and	03]	Inder	
	Elementary Concepts		1	Mukherjee	
2	The Absolutist State	03]	Inder	
			1	Mukherjee	
3	The Liberal State	03]	Inder	
			1	Mukherjee	
4	The Liberal State	03]	Inder	
			I	Mukherjee	
5	The state and class Marxist	03]	Inder	
	perspective		1	Mukherjee	
6	The ideological basis of the	03]	Inder	
	Welfare State and its compa	rison	1	Mukherjee	
	with Communism				

Semester I (AY 2022-2023)		Period July,2022 2023		to Jan,	
Pape	er: CC 2T (Early Historic	Full Mar	ks: 75	5 Cred	lit: 06
	a (proto history to 6th century				
B.C)	<u> </u>			T	1
S1.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Understanding early India		03	Alauddin	
				Seikh	
2	Neolithic to Chalcolithic settle	ements	03	Alauddin	
				Seikh	
3	The Aryans in India: Vedic A	ge	03	Alauddin	
				Seikh	
4	North India in sixth century B	SCE .	03	Alauddin	
				Seikh	
5	Ideas and institutions in early	India	03	Alauddin	
				Seikh	
6	Cults, doctrines and metaphys	sics	04	Alauddin	
				Seikh	
7	Aspects of economy in the ag	e of	03	Alauddin	
	Buddha			Seikh	
8	The cultural milieu		03	Alauddin	
				Seikh	

Curriculum Plan (ODD SEMESTER) (History Honours; CBCS)

Semester III (AY 2023-2024)		Period July,2022		to Jan, 2023	
Pape	r: CC5T (Delhi Sultanate	Full Mar	ks: 75	Credit	: 06
) (Th	eory)				
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	Interpreting the Delhi Sultar	nate – A	05	Alauddin	
	Survey of Sources:			Seikh	
2	Foundation, Consolidation a	and	05	Alauddin	
	Challenges to the Delhi Sult	tanate		Seikh	
3	Emergence of Regional Stat	tes:	05	Alauddin	
	Vijayanagara, Bahmani Kin	gdom,		Seikh	
	Bengal				
4	Society and Economy		05	Alauddin	
				Seikh	
5	Religion, Society and Cultur	re	05	Alauddin	

Soulzh
I SCIKII I

` '		Period July,2022 2023		to Jan,	
Pape	r: CC6T (The Feudal	Full Mai	rks: 75	Credit: 06	
Socie	ety) (Theory)				
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	Muhammad and Charlemagn	ne	05	Alauddin	
				Seikh	
2	Europe besieged		05	Alauddin	
				Seikh	
3	Feudal Society and Economy	y	05	Alauddin	
	(c.800—c.1100)			Seikh	
4	Emergence of National King	gship:	05	Alauddin	
				Seikh	
5	Religion and Culture		05	Alauddin	
				Seikh	

Sem	ester III (AY 2023-2024)	Period July,2	2022	to Ja	ın, 2023
-	er: CC7T (Akbar and the	Full Marks:	75	Credit:	•
	ing of Mughal India)	T dir ividiks.	7.5	Ci ca it.	00
	eory)				
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Sources and Historiography	V-	05	Alauddin	
		,		Seikh	
2	Establishment of Mughal R	Rule in India	05	Alauddin	
				Seikh	
3	Formation of Imperial authority &		05	Alauddin	
	Consolidation under Akbar	•		Seikh	
	and Conquests				
	_				
4	Expansion and integration-		05	Alauddin	
	Incorporation of Rajputs an	nd other		Seikh	
	indigenous groups in Mugh	nal nobility			
5	Rural Society and Economy	у	05	Alauddin	
				Seikh	
6	Religion and Culture		05	Alauddin	
				Seikh	

Semester III (AY 2022-2023)		Period July,2	2022	to Ja	ın, 2023
Pape	r: SEC1T (Literature and	Full Marks:	40	Credit:	02
Histo	ory: Bengal)				
(The	ory)				
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	History and Literature		02	Alauddin	
				Seikh	
2	Dichotomy between Itihasa	and History	02	Alauddin	
				Seikh	
3	Novel as a new literary gen	re	02	Alauddin	
				Seikh	
4	Power and Patriotism: Banl	kim's	02	Alauddin	
	Nationalism			Seikh	
5	Sarat Chandra Chattopadhy	ay and the	02	Alauddin	
	Indian Women of Early 20t	th Century		Seikh	
6	Narratives of Suffering		02	Alauddin	
				Seikh	
7	SatinathBhaduri & the Gan	dhian	02	Alauddin	
	Movement			Seikh	

Curriculum Plan (ODD SEMESTER) (History GE; CBCS)

Semester III (AY 2022-2023)		Period July,2	2022	to Ja	ın, 2023
Pape	er: GE3T (Some	Full Marks:	75	Credit	: 06
Pers	pectives on Women's				
Righ	ts in India) (Theory)				
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Definition of Human Right	S	05	Alauddin	
				Seikh	
2	Indian Constitution and Wo	omen's	05	Alauddin	
	Rights			Seikh	
3	Preventive Acts		05	Alauddin	
				Seikh	
4	Issues of Violence against	Women and	05	Alauddin	
	Remedial Measures			Seikh	
5	Role of Non-Government I	nstitutions	05	Alauddin	
				Seikh	
6	Present Status		05	Alauddin	

	Seikh	

Curriculum Plan (History Honours; CBCS)

Semo	ester V (AY 2023-2024)	Period July,	2022	to Jan, 2023	
Pape	r: CC11T (Select	Full Marks: 75		Credit: 06	
Then	nes in the Colonial Impact				
on In	idian Economy and				
Socie	ety)(Theory)				
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Colonial State institutions	and	05	Inder	
	ideologies:			Mukherjee	
2	Land Settlements and agricultural		05	Inder	
	change			Mukherjee	
				-	
3	Modern Industrialisation		05	Inder	
				Mukherjee	
4	Census and Caste		05	Inder	
				Mukherjee	
5	Reformism and Revivalism		05	Inder	
				Mukherjee	
6	Islamic reform in India		05	Inder	
				Mukherjee	

Seme	ester V (AY 2023-2024)	Period July,202		22	to	o Jan,
		2023	3			
Pape	r: CC12T (Peasant and	Full	Marks:	75	Cre	dit: 06
Triba	al Uprisings in Colonial India					
in the	e 19th Century) (Theory)					
S1.	TOPICS		CLASSE	S	Class	Remark
No.			ALLOTE	ED	taken by	
1	The Early 19th century		15	Inder M	ukherjee	
2	The Late 19th century		15	Inder M	ukherjee	
	-				-	

` '		Period July,2022 2023		t	to Jan,	
Pape	r: DSE1 (Modern	Full M	arks:	75 Cr	edit: 06	
Transformation of China (1839-						
1949	(Theory)					
S1.	TOPICS		CLASSES	Class taken	Remark	
No.			ALLOTED	by		
1	Pre-colonial China		05	Inder		
				Mukherjee		
2	Foreign Contact and Anglo-Chinese		05	Inder		
	Relations			Mukherjee		
3	Rebellion and Restoration		05	Inder		
				Mukherjee		
4	Movements, Reform and Resto	oration	05	Inder		
	in China			Mukherjee		
5	Formation of Communist Republics		05	Inder		
	in China			Mukherjee		

Seme	ester V (AY 2023-2024)	Period July,2022		to Jan,		
		2023				
Pape	r: DSE2 (Modern	Full M	larks:	75	Cred	it: 06
Tran	Transformation of Japan					
) (Th	eory)					
Sl.	TOPICS		CLASSI	ES	Class taken	Remark
No.			ALLOT	ED	by	
1	Pre-Meiji Japan		05		Inder	
					Mukherjee	
2	Meiji Restoration		05		Inder	
	-				Mukherjee	
3	Popular and Democratic		05		Inder	
	Movements:				Mukherjee	
4	Emergence of Japan as an Imp	perial	05		Inder	

	Power		Mukherjee
5	Japan through the two World Wars	05	Inder Mukherjee

Curriculum Plan (Even SEMESTER) (History Gen; CBCS)

Sem	ester II (AY 2023-2024)	Period:	Feb,2	023 to	
		July,2023			
Pape	er: Core-3 (DSC-1B) or Core-4	Full Marks:	75	Credit:	06
(DSC-2	B (Medieval India) (Theory)				
Sl.	Paper/Topio	,	CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Medieval India		25	Alauddin	
				Seikh	

Curriculum Plan (Even SEMESTER) (History Gen; CBCS)

Semester I	V (AY 2023-2024)	Period: July,2023	Feb,2	2023 to	
_	-7 (DSC-1D)or Core-8 (DSC- n nationalism in India)	Full Marks:	75	Credit:	06
Sl. No.	Paper/Top	oic	CLASSES ALLOTED	Class taken by	Remark
1	Modern nationalism in Indi	ia	25	Alauddin Seikh	
SEC-2 (FM- 40, Credit- 02)	SEC- 2 : Literature and Hist	ory: Bengal	16	Alauddin Seikh	

Curriculum Plan (Even SEMESTER) (History Gen; CBCS)

Semester V	/I (AY 2023-2024)	Period:	Feb,2	2023 to Ju	ıly,2023
Paper: DSE-	1B / 2B (Modern	Full Marks:	75	Credit: (06
Europe) (Th	eory)				
Sl. No.	Paper/To	pic	CLASSES	Class	Remark
			ALLOTED	taken by	
1	Modern Europe		25	Inder	
				Mukherjee	
GE- 2 (FM-	GE- 2 : Some Perspective	s on Women's	16	Alauddin	
75, Credit-	Rights in India			Seikh	
06)					
SEC- 4 (FM-	SEC- 4: Art Appreciation	An introduction	16	Inder	
40, Credit-	to Indian art			Mukherjee	
02)					

Curriculum Plan (Odd SEMESTER) (History Gen; CBCS)

Sem	ester I (AY 2023-2024)	Period: Jul	y,2022	to Jan, 2023	
Paper: Core-1 (DSC-1A) / Core-2		Full Marks: 75		Credit: 06	
(DSC-2A) (Ancient India) (Theory)					
Sl.	Paper/Topic		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1			25	Inder	
	Ancient India			Mukherjee	

Curriculum Plan (Even SEMESTER) (History Gen; CBCS)

Semester III (AY 2023-2024)		Period : July,2022 2023		to Jan,	
Paper: Core-5 (DSC-1C / Core-6 (DSC-2C) (Selected themes in the Colonial impact on Indian Economy and Society) (Theory)				Credit:	06
Sl. No.	Paper/Top	pic	CLASSES	Class	Remark
			ALLOTED	taken by	
1	Selected themes in the Colonial impact on		25	Alauddin Seikh	
SEC-1 (FM- 40, Credit- 02)	Indian Economy and Societ SEC- 1: The Making of Indian Foreign Policy		16	Alauddin Seikh	

Curriculum Plan (Even SEMESTER) (History Gen; CBCS)

Semester VI (AY 2023-2024)		Period:	July,2022		to Jan,
		2023			
Paper: DSE-	1A / 2A(Renaissance	Full Marks:	75	Credit: (06
and Reformati	on) (Theory)				
Sl. No.	Paper/To	pic	CLASSES	Class	Remark
			ALLOTED	taken by	
1			25	Inder	
	Renaissance and Reform	ation		Mukherjee	
GE- 1 (FM-	GE- 1 : Science and Empi	re	16	Alauddin	
75, Credit-				Seikh	
06)					
SEC- 3 (FM-	SEC- 3 : Colonial Science in India:		16	Inder	
40, Credit-	Institutions and Practices	5		Mukherjee	
02)					

Department of Political Science

Curriculum Plan 2023-24

Political Science Hons. (2nd, 4th, 6thSemester)

Semester	Paper	Unit	No. of Lectures	To be completed By
	MAJOR -2	Unit 1-4		
		Internal Examinat		1-3 rd Month
		Unit 5-8	12	4-5 th Month
		Revision and prep University examin		6 th Month
	SEC-2	FIELD SURVEY POLITICS AND I REPORT		5-6 th Month
	MINOR-2	Unit 1, 2 & 3, 4	12	1-3 rd Month
2 nd Semester		Internal Examinat	ion	1-3 Wollin
	(Students from	Unit 5, 6, 7, 8	12	4-5 th Month
	other Discipline)	Revision and prep University examin		6 th Month
	MDC-2	Unit 1, 2, 3	12	1-3 rd Month
	(Students from	Internal Examinat	T 3 William	
	all disciplines)	Unit 4 & 5	10	4-5 th Month
		Revision and preparation for the University examination		6 th Month
	CC-8	Unit 1, 2 & 3	12	
		Internal Examination		1-3 rd Month
4 th Semester		Unit 4, 5, & 6	12	4-5 th Month
		Revision and preparation for University examination		6 th Month
	CC-9	Unit 1, 2 & 3	12	1-3 rd Month
		Internal Examination		
		Unit 4 & 5	10	4-5 th Month
		Revision and preparation for University examination		6 th Month
	CC10	Unit 1 & 2	10	1-3 rd Month

		Internal Examinati	ion	
		Unit 3	4	4-5 th Month
		Revision and prepa University examin		6 th Month
		Unit 1, 2, & 3	10	1-3 rd Month
4 th Semester	SEC-2	Internal Examinati	on	
		Unit 4 & 5	10	4-5 th Month
		Revision and prepa University examin		6 th Month
	GE-4	Unit 1 &2	10	1-3 rd Month
		Internal Examinati	ion	
	(Students from other Discipline)	Unit 3	03	4-5 th Month
		Revision and prepa University examin		6 th Month
	CC-13	Unit 1 &2	12	1-3 rd Month
		Internal Examination		
		Unit 3 & 4	12	4-5 th Month
		Revision and prepa University examin	6 th Month	
	CC-14	Unit 1, 2, 3, 4, 5 & 6	12	1-3 rd Month
		Internal Examination		
		Unit 7, 8, 9, 10, 11 & 12	12	4-5 th Month
6 th Semester		Revision and preparation for University examination		6 th Month
	DSE-3	Unit 1	10	1-3 rd Month
		Internal Examinati	ion	1-3 Month
		Unit 2	10	4-5 th Month
		Revision and prepa University examin		6 th Month
	DSE-4	FIELD SURVEY AND PROJECT WORK		5-6 th Month

Department of Political Science

Curriculum Plan 2023-24

Political Science Hons. (1st, 3rd, 5thSemester)

Semester	Paper	Unit	No. of Lectures	To be completed By
	MAJOR -1	Unit 1 12		- 1-3 rd Month
		Internal Examination	on	
		Unit 2	12	4-5 th Month
		Revision and prepa University examina		6 th Month
	SEC-1	FIELD SURVEY OF PANCHAYATI R. MANAGEMENT OF PROJECT REPOR	ON AJ SYSTEM &	5 th -6 th Month
	MINOR-1	Unit 1, 2, 3 & 4	12	1-3 rd Month
		Internal Examination	on	1 0 1/101111
1 st Semester	(Students from	Unit 5, 6, 7& 8	12	4-5 th Month
	other Discipline)	Revision and preparation for the University examination		6 th Month
	MDC-1	Unit 1, 2 12		
		Internal Examination	on	1-3 rd Month
	(Students from all disciplines)	Unit 3	10	4-5 th Month
	•	Revision and preparation for the University examination		6 th Month
	CC-5	Unit 1 & Unit 2 10 Internal Examination		1-3 rd Month
		Unit 3	8	4-5 th Month
3 rd Semester		Revision and preparation for University examination		6 th Month
		Unit 1 & Unit 2 10		
		Internal Examination	on	1-3 rd Month
	CC6	Unit 3 & 4	10	4-5 th Month
		Revision and preparation for University examination		6 th Month
		Unit 1 & 2	10	1-3 rd Month
		Internal Examination		d
	CC7	Unit 3	10	4-5 th Month
		Revision and preparation for the University examination		6 th Month
		Unit 1, 2, & 3	10	- 1-3 rd Month
	SEC-1	Internal Examination	on	1-3 Month

		Unit 4 & 5	10	4-5 th Month
		Revision and prepa University examin	aration for the ation	6 th Month
	GE-3	Unit 1 &2 Internal Examinati	10 on	1-3 rd Month
3 rd Semester	(Students from other Discipline)	Unit 3 & 4	10	4-5 th Month
		Revision and prepa University examin		6 th Month
	CC11	Unit 1 &2	12	1-3 rd Month
		Internal Examinati	on	
		Unit 3 & 4	12	4-5 th Month
		Revision and preparation for University examination		6 th Month
		Unit 1, 2, 3	10	1-3 rd Month
		Internal Examinati		
	CC12	Unit 4, 5, 6	10	4-5 th Month
5 th Semester		Revision and preparation for University examination		6 th Month
		Unit 1, 2, 3	10	1-3 rd Month
	DSE-1	Internal Examination		1-3° Month
		Unit 4, 5, 6	10	4-5 th Month
		Revision and prepa University examin	aration for the ation	6 th Month
		Unit 1, 2	10	1-3 rd Month
		Internal Examination		
	DSE-2	Unit 3	10	4-5 th Month
		Revision and preparation for the University examination		6 th Month

Department of Political Science

Curriculum Plan 2022-23

Political Science Hons. (2nd, 4th, 6th Semester)

Semester	Paper	Unit	No. of Lectures	To be completed By
	CC-3	Unit 1 & 2	12	
		Internal Examinat	ion	1-3 rd Month
		Unit 3 & 4	12	4-5 th Month
		Revision and prep	paration for	6 th Month
		University examin	nation	
		Unit 1,2, 3 & 4	14	a ard a s
		Internal Examinat	ion	1-3 rd Month
		Unit 5, 6 & 7	12	4-5 th Month
2 nd Semester	CC-4	D		6 th Month
l		Revision and prep University examin		o Month
	GE-2	Unit 1, 2 & 3	12	
	GE-2	Omt 1, 2 & 3	12	
				1-3 rd Month
		Revision and prep		1 5 14101111
	(Students from	University examin	nation	
	other Discipline)	Unit 4 & 5	12	4-5 th Month
		Revision and prep	paration for	6 th Month
		University examination		
	CC-8	Unit 1, 2 & 3	12	
		Internal Examinat	ion	1-3 rd Month
4 th Semester		Unit 4, 5, & 6	12	4-5 th Month
		Revision and preparation for University examination		6 th Month
	CC-9	Unit 1, 2 & 3	12	
		Internal Examinat	ion	1-3 rd Month
		Unit 4 & 5	10	4-5 th Month
		Revision and preparation for		
		University examin	nation	6 th Month

	CC10	Unit 1 & 2	10	1-3 rd Month
		Internal Examinati	Internal Examination	
		Unit 3	4	4-5 th Month
		Revision and prepa University examin		6 th Month
		Unit 1, 2, & 3	10	1-3 rd Month
4 th Semester	SEC-2	Internal Examinati	on	1-5 Worth
		Unit 4 & 5	10	4-5 th Month
		Revision and prepa University examin		6 th Month
	GE-4	Unit 1 &2	10	1-3 rd Month
		Internal Examinati	on	
	(Students from other Discipline)	Unit 3	03	4-5 th Month
		Revision and prepa University examin		6 th Month
	CC-13	Unit 1 &2	12	1-3 rd Month
		Internal Examination		
		Unit 3 & 4	12	4-5 th Month
		Revision and prepa University examin		6 th Month
	CC-14	Unit 1, 2, 3, 4, 5 & 6	10	1-3 rd Month
		Internal Examinati		
		Unit 7, 8, 9, 10, 11 & 12	10	4-5 th Month
6 th Semester		Revision and preparation for University examination		6 th Month
	DSE-3	Unit 1	10	1-3 rd Month
		Internal Examinati	on	1-3 Month
		Unit 2	10	4-5 th Month
		Revision and prepa University examin		6 th Month
	DSE-4	FIELD SURVEY AND PROJECT WORK		5-6 th Month

Department of Political Science

Curriculum Plan 2023-24

Political Science General (1st, 3rd, 5th Semester)

Semester	Paper	Unit	No. of Lectures	To be completed By	
	Major -A1	Unit 1	12		
	(Those who have	Internal Examina	ation	1-3 rd Month	
	taken Pol. Sc. As 1 st Subject)	Unit 2	10	4-5 th Month	
	1 Subject)	Revision and pre University exam		6 th Month	
	SEC-1	FIELD SURVEY PANCHAYATI MANAGEMEN PROJECT REPO	RAJ T SYSTEM &	5- 6 th Month	
1 st Semester	MDC-1	Unit 1, 2	12	1-3 rd Month	
	(Students from all Disciplines)	Internal Examina	ation		
		Unit 3	10	4-5 th Month	
		Revision and preparation for University examination		6 th Month	
	MINOR-C1	Unit 1	12		
	(Those who have	Internal Examination		1-3 rd Month	
	taken Pol. Sc. As	Unit 2	10	4-5 th Month	
	3 rd Subject)	Revision and preparation for University examination		6 th Month	
	DSC-1C	Unit 1- 3	10		
	Or	Internal Examination		1-3 rd Month	
3 rd Semester	DSC-2C	Unit 4-6	10	4-5 th Month	
		Revision and pre University exam		6 th Month	
	SEC-1	Unit 1-3	10	1-3 rd Month	
		Internal Examination			
		Unit 4-5	10	4-5 th Month	
		Revision and preparation for University examination		6 th Month	
	DSE 1A	Unit 1 & 2	10	1-3 rd Month	

		Internal Examination		
	Or	Unit 3	10	4-5 th Month
	DSE 2A	Revision and preparation for University examination		6 th Month
		Unit 1, 2	12	1-3 rd Month
#th @	SEC-3	Internal Examination		1-3 Month
5 th Semester		Unit 3	10	4-5 th Month
		Revision and preparation for University examination		6 th Month
	GE-1	Unit 1-3	10	1-3 rd Month
	(Students from other Discipline)	Internal Examination		
	other Discipline)	Unit 4-5	10	4-5 th Month
		Revision and preparation for University examination		6 th Month

Department of Political Science

Curriculum Plan 2022-23

Political Science General (2nd, 4th, 6thSemester)

Semester	Paper	Unit	No. of Lectures	To be completed By
	DSC-1B	Unit 1-4	12	1 2rd 3 6 4
2 nd Semester	OR	Internal Exami	nation	1-3 rd Month
2 Semester	DSC-2B	Unit 5-8	12	4-5 th Month
		Revision and p University exact	reparation for mination	6 th Month
	DSC-1D	Unit 1- 2	10	
	Or	Internal Exami	nation	1-3 rd Month
4 th Semester	DSC-2D	Unit 3	10	4-5 th Month
		Revision and p University exa		6 th Month
	SEC-2	Unit 1-3	10	
		Internal Exami		1-3 rd Month
		Unit 4-5	10	4-5 th Month
		Revision and p University exa		6 th Month
	DSE 1B	Unit 1 & 2	10	1-3 rd Month
		Internal Exami	nation	
	Or	Unit 3	10	4-5 th Month
	DSE 2B		Revision and preparation for University examination	
		Unit 1- 2	12	1 2rd 2 f
	SEC-4	Internal Exami	nation	— 1-3 rd Month
6t th Semester		Unit 3-4	10	4-5 th Month
		Revision and preparation for University examination		6 th Month
6 th Semester	GE-2	Unit 1-2	12	

(Students from	Internal Examination		1-3 rd Month	
other Discipline)	Unit 3	06	4-5 th Month	
	Revision and preparate University examination		6 th Month	

Government General Degree College, Keshiary Department of Political Science Curriculum Plan 2022-23 Political Science General (1st, 3rd, 5th Semester)

Semester	Paper	Unit	No. of Lectures	To be completed By
	DSC 1A	Unit 1-2	12	
1 st Semester	Or DSC 2A	Internal Examin	nation	1-3 rd Month
		Unit 3	10	4-5 th Month
		Revision and pr University exar		6 th Month
	DSC-1C	Unit 1- 3	10	
	Or	Internal Examin	nation	1-3 rd Month
3 rd Semester	DSC-2C	Unit 4-6	10	4-5 th Month
		Revision and pr University exar		6 th Month
	SEC-1	Unit 1-3	10	1-3 rd Month
		Internal Examin	nation	
		Unit 4-5	10	4-5 th Month
		Revision and pr University exam		6 th Month
	DSE 1A	Unit 1 & 2	10	1-3 rd Month
		Internal Examin	nation	1-3 Worth
	Or	Unit 3	10	4-5 th Month
	DSE 2A	Revision and preparation for University examination		6 th Month
		Unit 1, 2	12	1 274 2 4
	SEC-3	Internal Examin	nation	1-3 rd Month
5 th Semester		Unit 3	10	4-5 th Month
		Revision and pr University exar		6 th Month
5 th Semester	GE-1	Unit 1-3	10	1-3 rd Month
	(Students from	Internal Examin	nation	1
	other Discipline)	Unit 4-5	10	4-5 th Month

	Revision and preparation for	6 th Month
	University examination	

Curriculum Plan (EVEN SEMESTER) (ANTHROPOLOGY Honours; CBCS)

Seme	ster II (AY 2023-2024)	Period:		to		
Paper	r: CC 3T (Archaeological Anthropology)	Full Marks:	40	Cre	edit: 04	
(Theo						
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Introduction to Archaeological Anthropological anthropology 2. R disciplines 3. Methods of studying archaeological anthropology 2.	telation with ot	her	12	AS/SD	
2	Methods of Estimation of Time and Reconstruction of the Past 1. Absolute dating methods (c14, K-Ar, TL, Dendrochronology, Palaeomagnatism) 2. Relative dating methods (Stratigraphy, FUN estimation) 3. Methods of climatic reconstruction: palynology, paleontology, soil pH estimation. Geochronology of Pleistocene Epoch 1. Glacial and Interglacial			12	AS	
3	Geochronology of Pleistocene Epoch 1. Gl 2. Pluviation and Inter Pluviation 3. Difference geoclimatic events		glacial	12	SD	
4	Understanding Culture 1. Technique of to estimation of their relative efficiency 2. Cl primary and combination fabrication tech and cultural nomenclature 4. Palaeolithic, Neolithic Culture of Europe and India.	assification of niques 3. Typo	tools: logy	12	SD	
5	Earliest Evidence of Culture in the World of Colduvai Gorge, Stellenbosch. 2. Pirro Nord Patjitanian, Choukoutien, Anyathian. 3. So Narmada, Bhimbetka.	d, Dmanisi, Alp	uerca,	12	AS	

Seme	ster II (AY 2023-2024)	Period:		to			
Paper	r: CC 3P (Archaeological Anthropology	Full Marks:	20	Cre	Credit: 02		
(Lab)) (Practical)						
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark	
1	Typo-technological Analysis of Prehistoric Interpretation and Drawings of the tool T Types – any three Chopper, Hand axe, Cle Types – any two Scrapers, Points. 3. Blade Knife, Blade, Burin. 4. Microlithic Tool Type Lunate, Trapeze. 5. Neolithic Tool Type – Chissel, Ringstone. 6. Bone Tools – Barbe point, Baton-de-commandmen	Types 1. Core Too eaver. 2. Flake To e Tool Types – a oe – any two Tria any two Axe, Ac	ol ool ny two angle, lze,	12	AS/SD		

Semes	ster II (AY 2023-2024)	Period:	to		
	: CC 4T (Fundamentals of Human Origin	Full Marks: 40	Cre	edit: 04	
	volution) (Theory)			1	_
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1 Primate origins and radiation with Parapithecus, Ramapithecus, Dryopithecu their distribution, features with their phyl relationships	ıs, Sivapithecus and	10	PR	
2	Unit 2 1. Australopithecines: distribution, phylogenetic relationships. 2. Appearance (Homo habilis) and related finds.		10	PR	
3	Unit 3 The origin of Homo sapiens: Fossil Neanderthals and Archaic Homo sapiens	evidences of	10	JRT	
4	Unit 4 The origin of Homo sapiens: Fossil Neanderthals and Archaic Homo sapiens	evidences of	10	JRT	
5	Unit 5 Origin of anatomically modern hun sapiens): Distribution and features Brief of human origin: Out-of-Africa and Replac	outline of the models	10	JRT	
6	Unit 6 Hominisation process, Biology and	culture Co-evolution	10	PR	

Semes	ster II (AY 2023-2024)	Period:	to		
Paper	: CC 4P (Fundamentals of Human Origin	Full Marks: 20	Cre	edit: 02	
and Ev	olution (Lab)) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Craniometry		4	PR	
	a) Maximum Cranial length and	breadth b) Maximum			
	bizygomatic breadth c) Maxir	num frontal breadth			
	d) Minimum frontal breadth e	e) Nasal height and			
	breadth f) Bi-Mastoid Breadtl				
	breadth h) Upper facial heigh	t i) Cranial index j)			
	Nasal index				
2	2. Osteometry: Measurements of long an	d flat bones: (Any	4	PR	
	three) Lengths, minimum/least circumfer	ence and caliber index			
3	3. Identification of casts of fossils of famil	y hominidae: Drawing	4	JRT	
	and comparison of characteristics				

Curriculum Plan (EVEN SEMESTER) (ANTHROPOLOGY Honours; CBCS)

Semes	ster IV (AY 2023-2024)	Period:		to		
Paper	: CC8T (Theories of Culture and Society)	Full Marks:	40	Cre	edit: 04	
(Theo						_
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1 Emergence of Anthropology: Interface of Enlightenment with evolutionary Biology, Society and Colonialism. changing perspectives on Evolutionism, Diffusionism and Culture area theories				AS/SD	
2	Unit 2 Emergence of fieldwork tradition: Diffusionism and Historical Particularism, Tradition		ral	10	SD	
3	Unit 3 Making Anthropology a Science: Do Solidarity, Functionalism, Structural-funct Social Anthropology. Concepts of Social S Organization.	tionalism and Br	itish	10	SD	
4	Unit 4 Anthropology's Cognitive Adventu	re: Structuralism	1	10	AS	
5	Unit 5 Symbolic and Interpretative approa	aches		10	AS	
6	Unit 6 Cultural Relativism and Ethnocentr	ism		10	AS	

Seme	ster IV (AY 2023-2024)	Period:		to		
Paper	r: CC8P (Theories of Culture and Society	Full Marks:	20	Cre	dit:	
Lab)	(Practical)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	List of Practical As a part of the practical f will be undertaken by the students so as a connect the theories they learn with thing 1. To identify a topic relating to contempt formulate research questions and clearly theoretical perspectives from which they Identification of variables of a study. 3. Variables of a study. 3. Variables of the study of the service of the study of the service of the service of the oretical framework. 8. Data analysis	to enable them gs of everyday orary issue and identify the are derived. 2. arious types of . 5. Distinction ory research. 6. ly with justificate and method ir	to living. tions7.	12	AS	

Seme	ster IV (AY 2023-2024)	Period:	to		
_	: CC9T (Human Growth and	Full Marks: 4	0 Cre	edit: 04	
	opment) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1 Concept of human growth, developed and maturation.	Unit 1 Concept of human growth, development, differentiation and maturation.			
2	Unit 2 Outlines of Prenatal and postnatal general growth curve (Scammon's growth Growth curve (Distance and acceleration) differences in growth, Concept of secular	8	JRT		
3	Unit 3 Concept of Methodology of growth study: Longitudinal, Cross section and mixed longitudinal Concept of factors affecting growth: genetic, social, and ecological factors Significance/ applicability of growth studies (Outline)			JRT	
4	Unit 4 Nutritional epidemiology-concept of Food, Nutrition and Diet Concept of under nutrition and over nutrition with reference to Kwashiorkor Marasmus and obesity Concept of Stunting and Wasting Assessment of nutritional status (Outline of the utilization of Anthropometry)			PR	
5	Unit 5 Concept of Human physique and boundels and techniques; gender and ethni		8	PR	
6	Unit 6 Concept of Somatotyping and interphysique with reference to Sheldon, Heat	•	8	PR	
7	Unit 7 Bio-cultural adaptation to environr Concepts of Homeostasis and thermoregon rules and their applicability among human	ulation, ecological	8	PR	

Seme	ster IV (AY 2023-2024)	Period:		to		
Paper	: CC9P (Human Growth and	Full Marks:	20	Cre	edit: 02	
Develo	opment Lab) (Practical)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	List of Practical 1. Evaluation of Growth status: Anthropometry (stature, body weight, mid upper arm circumference, chest circumference, head circumference), assessment of chronological age, percentile, z-score, height for age, weight for age, BMI for age			4	PR	
2	2. Obesity assessment: General obesity: B Regional adiposity: WC, HC, WHR, WHtR)	2. Obesity assessment: General obesity: BMI, Conicity index.			JRT	
3	Estimation of body composition: Percent body fat skinfold thickness and bioelectric impedance analysis		4	PR		
4	4. Nutritional assessment through dietary anthropometric indices	pattern and		4	JRT	

	ter IV (AY 2023-2024)	Period:		to		
	CC10T (Research Methods) (Theory)	Full Marks:	40		dit: 04	•
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Research Design Types of Researches in A Quantitative, Qualitative, and Mixed. Rev conceptual framework, formulation of resformulation of hypothesis, sampling, tool data collection, data analysis and reportir critical evaluation of major approaches in basic tenets of qualitative research and it quantitative research.	iew of literature, search problem, s and techniques of ag, guiding ideals ar research methods,	nd ,	10	SD	
2	Field work tradition in Anthropology Ethn contribution of Malinowski, Boas and oth relativism, ethnocentrism, etic and emic p comparative and historical methods, tech establishment identification of representa informants, maintenance of field diary an	er pioneers; cultura perspectives, niques of rapport ative categories of		10	SD	
3	Tools and techniques of data collection Corelationship of survey method with ethnoconstruction of questionnaire and interview validation and internal consistency of que Observation - Direct, Indirect, Participant, Controlled Interview - Structured and uns Group Discussion, key informant interview history, Genealogy - Technique and applications.	graphic method, ew schedule, estionnaire . Non-participant, tructured, Focusse v, Case Study and I		10	SD	
4	Ethics and Politics of Research 1. Identify, ethical issues in the context of human sub Reasons for conducting ethical review of importance of consent, privacy and confid 3. Ethical importance of consent, privacy research 4. Issues of academic fraud and interest, authorship and publication	oject research. 2. research, Ethical dentiality in researc and confidentiality	ch in	10	SD	
5	Analysis and Writing Up 1. Chapterization submission and publication, concepts of pand footnotes), glossary, prologue and epbibliography (annotated) and references index. 2. Similarities and differences between quantitative data analysis; introduction of analysis.	oreface, notes (end ilogue, appendix, cited, review and reen qualitative and	d	10	SD	
6	Bio-Statistics 1. Types of variables, present summarization of data (tabulation and illustration) Descriptive statistics- Measurers of Central of Variation, Skewness and Kurtosis, Variation	ustration). 2. al Tendency, Meası	ure	10	JRT	

deviation, Normal and binom	ial distribution. 3. Tests of	
Inference- Variance ratio test	, Student's't' tests, Chi-square	
test and measures of associat	ion, Analysis of variance,	
Estimation of confidence inte	rval, Correlation, Regression	
Analysis, Study design issues:	Sample size and Power, 4.	
Pedigree Analysis- Importanc	e and implication.	
, ,	'	

Semester IV (AY 2023-2024)		Period:		to		
Paper	: CC10P (Research Methods Lab)	Full Marks:	20	Cre	edit: 02	
(Pract	tical)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	List of Practical 1. Construction of Geneal	ogy. 2. Observa	ation:	12	SD/JRT	
	Direct, Indirect, Participant, Non-participa	ant, Controlled	3.			
	Questionnaire and Schedule, Interview- L	Instructured,				
	Structured, Key informant interview, Foci	ussed Group				
	Discussion, and Free listing, pile sorting 4	. Case study an	d life			
	history 5. Project report writing: preparat	ion of research	1			
	problem, study design, data collection techniques, analysis and					
	report writing based on somatometric, dermatoglyphic and					
	serological data or any contemporary soc	ial problem.				

Semes	ster IV (AY 2023-2024)	Period:	to		
_	: SEC2T (Tourism Anthropology)	Full Marks: 40	Cre	edit: 02	
(Theo					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit I: Tourism- aspects and prospects, and theoretical concerns, tourist as ethnoron and Authenticity Issues		8	AS	
2	Unit II: Interconnections between tourism of the socio-cultural study of tourism incl migration, colonial exploration, pilgrimag imagined and remembered journeys, and	uding temporary e, visiting relatives,	8	AS	
3	Unit III: understand the implications of to mechanism of cross-cultural interaction; semiotics, and the imagination in tourism commodification of culture or cultural de	role of symbolism, n; tourism and the	8	AS	
4	Unit IV: understand the global and local procession contemporary tourism, particularly in relationsh development; explore dynamic relationsh making enterprises, revival and preservat international flow of capital; role of muse branches of the cultural industries" (inclufood) in tourism economies; tourism and Ecotourism and sustainable development	ation to international nips between heritage- tion projects, the eums and other Iding music, art, and global mobility;	8	AS	
5	Unit V: New Directions in the Anthropolo	gy of Tourism:	8	AS	

Globalization, Tourism and Terrorism; applied aspects of		
anthropology in tourism development and planning.		

Curriculum Plan (EVEN SEMESTER) (ANTHROPOLOGY Honours; CBCS)

Semes	ster VI (AY 2023-2024)	Period:		to		
Paper	: CC13T (Forensic Anthropology)	Full Marks:	40	Cr€	edit: 04	
(Theo				CLASSES		
Sl. No.	TOPICS				Class taken by	Remark
1	Unit 1 Introduction to Forensic Anthropo History, Scope, Applications and Integrati Anthropology.	Brief	12	JRT/PR		
2	Unit 2 Basic Human Skeletal Biology, Identification of Human and Non-Human Skeletal Remains, Ancestry, age, sex and stature estimation from bones, Discovery and Techniques for recovering skeletonized Human Remains.				PR	
3	Unit 3 Personal Identification, Complete and Partial Identification, Methods of Identification in Living Persons: Anthropometry, Anthroposcopy, Occupational Marks, Scars, Bite Marks, Tattoo Marks, Fingerprints, Footprints, Lip Prints, Nails, Handwriting, Deformities and Others.				JRT	
4	Unit 4 Serology: Outline concept of ident identification of bloodstain, urine, semen Interpretation of patterns of bloodstains	and saliva.	onal	12	JRT	
5	Unit 5 Individualization: Forensic Odonto and Growth, Bite Marks, Facial Reconstru			12	PR	

Seme	ster VI (AY 2023-2024)	Period:		to		
Paper	Paper: CC13P (Forensic Anthropology Lab) Full Marks: 2			Cre	dit: 02	
(Prac	tical)					
Sl. No.	,			CLASSES ALLOTED	Class taken by	Remark
1			6	PR		
2	3. Identification of bloodstain, urine, semen and saliva. 4. Examination of Fingerprints: Concept of Latent Print identification. Finger Print matching (Concept of minutiae)		6	JRT		

	ster VI (AY 2023-2024)	Period:	to		
-	: CC14T (Anthropology of India)	Full Marks:	40 Cre	edit: 04	
(Theo			1 02		I
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1 1. Origin, history and developmen India, approaches to study Indian society traditional and contemporary 2. Racial are in Indian population 3. Understanding the social structure - concept of Varna, Jati, Copurusharatha, gender hierarchies - their impact, origin and evolution of social structure philosophies.	and culture- nd linguistic element e diversity of Indian Caste, Ashram or economic and cultur	8	SD	
2	Unit 2 1. Critical appraisal of contribution Sarkar towards understanding ethnic distribution of contemporand archaeological anthropologists in Inc.	tinctness in the India erary biological, socia	ın	SD	
3	Unit 3 1. Aspects of Indian Village –social agriculture and impact of market econon	_	8	AS	
4	Unit 3 2. Tribal situation in India- biogeneral linguistic and socio-economic characterist peoples, land-alienation, indebtedness, land-alienation, migration, facilities, shifting-cultivation, migration, funemployment, health and nutrition, tributest for identity	tics; Problems of trik ack of educational orests and tribal	oal 8	AS	
5	Unit 3 3. Developmental projects- tribal of rehabilitation problem	displacements and	8	AS	
6	Unit 3 4. Impact of culture-contact, urbai industrialization on tribal and rural popul		8	SD	
7	Unit 3 5. Basic concepts -Great tradition a sacred complex, Universalization and par Sanskritization and Westernization, Dom caste continuum, Nature-Man-Spirit com	ochialization, inant caste, Tribe-	m, 8	SD	
8	Unit 4 1. Problems of exploitation and de caste/ tribe and Other Backward Classes. safeguards for the Scheduled caste and s	2. Constitutional	ed 8	AS	

Semes	ster V (AY 2023-2024)	Period:		to		
Paper	: CC14P (Anthropology of India Lab)	Full Marks:	20	Cre	dit: 02	
(Pract	rical)					
Sl. No.	TOPICS			CLASSES	Class	Remark
				ALLOTED	taken by	

1	1. Identify various traits/variables which can be used in racial	8	AS/SD	
	classification and comment on its relevance. 2. Review a			
	book/edited volume on Indian social structure such as caste,			
	religion, tribe or rural population and give its salient features.			
	3. Explore the biological diversity of any population group			
	considering a minimum of five genetic traits. 4. Highlight the			
	contributions of any two contemporary Indian anthropologists			

Semes	ster VI (AY 2023-2024)	Period:		to		
Paper	: DSE3 (Tribal cultures of India)	Full Marks:	40	Cre	edit: 04	
(Theo						
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit I: Concept of tribes and its problematic nature, General and specific characteristics of tribes, Tribes in India: Antiquity, historical, academic, administrative and anthropological importance, Denotified tribes.				AS	
2	Unit II: Tribe- caste continuum, Constituti safeguard/provisions, Gender and Tribe, I in India		ibes	6	AS	
3	Unit III: Tribes: Nomenclature- emic and e Classification of tribes based on their ecor religion, Racial elements among the tribes scheduled categories of tribes	nomy, occupatio		6	AS	
4	Unit IV: Tribal movements, Tribal monogr tribal development	aphs, Problems (of	6	AS	
5	Unit V: Forest policies and tribes, Migration shift, Tribal arts and aesthetics Displacem and social change Globalization among In	ent, rehabilitatio		6	AS	

Semester VI (AY 2023-2024) Period: to					
Paper	: DSE3 (Tribal cultures of India Practical)	Full Marks: 20	Credit: 02		
(Pract	cical)				
Sl. No.	TOPICS		CLASSES	Class	Remark
			ALLOTED	taken by	
1	Distribution of Indian Tribes: PTG, ST Loca	ition of different	6	AS	
	tribes on the map of India Write an annot	ated bibliography on			
	any one tribe Write the social structure of any one tribe of				
	India				

Semes	ster VI (AY 2023-2024)	Period:	to		
Paper	: DSE4 (Project Work) (Theory and	Full Marks: 60	Cı	redit: 06	
Practi	cal)				
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	Project Work Student will opt either dissertation or project work or one paper from the elective discipline course. He/she will be attached with one supervisor or guide.			AS/SD/PR	

Curriculum Plan (ODD SEMESTER) (ANTHROPOLOGY Honours; CBCS)

	ster I (AY 2023-2024) Per		to		
	· ·	Marks:	40 Cre	edit: 04	
anthro	opology) (Theory) TOPICS		CLASSES	Class	Remark
SI. INO.	TOPICS		ALLOTED	taken by	Remark
1	Unit 1 Definition, Scope and sub-disciplines of Anthro	pology.	5	JRT	
2	Unit 1 History of Physical Anthropology and developm Biological anthropology	nent of Moderr	5	JRT	
3	Unit 1 aim, scope and its relationship with allied disci	plines	5	JRT	
4	Unit 1 Difference in the approaches of modern and tr Biological Anthropology, with emphasis on hur and variation		5	JRT	
5	Unit 1 Application of Biological anthropology in Huma development	n welfare and	5	JRT	
6	Unit 2 History and development of understand variation and evolutionary thought. Theories o Human variation and evolution:, pre-19th and Century.	f evolution.	5	PR	
7	Unit 2 History and development of understand variation and evolutionary thought. Theories o Theories of evolution. Lamarckism, Neo Lamar Darwinism, Modern Synthetic theory, and Neu molecular evolution.	f evolution. ckism,	5	PR	
8	Unit 3 Non-human primates in relation to hum Classification and characteristics of living prima suitable examples		5	JRT	
9	Unit 3 Non-human primates in relation to hum Outlines of comparative anatomy and behavio non-human primates		5 d	JRT	
10	Unit 3 Non-human primates in relation to hum Significance of non-human primate study in Bio Anthropology.		5	JRT	
11	Unit 4 Great divisions of humanity UNESCO Statement on Race. Racism		5	PR	
12	Unit 4 Great divisions of humanity		5	PR	
	z			1	1

Outline of racial classifications: (a) World Context : Denikar, Dixon, Haddon, Hooton, Eickstedt and Coon-Garn-Birdsell (b) Indian context: Risley, Guha and Sarkar		
ilidiali Context. Risiey, Gulia alid Sarkai		

Seme	ster I (AY 2023-2024)	Period:		to		
_	: CC 1P (Introduction to Biological	Full Marks:	20	Cre	edit: 02	
1	opology Lab) (Practical)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Anthropometry - Maximum head length,			4	PR	
	breadth, Minimum frontal breadth, Maxir	num bizygoma [.]	tic			
	breadth, Bigonial breadth, Nasal height, N	lasal length, Na	asal			
	breadth, Physiognomic facial height, Mor	phological facia	al			
	height, Physiognomic upper facial height,	Morphological	upper			
	facial height, Head circumference, Stature	e, Sitting height	t, Body			
	weight					
2	Anthroposcopy Head form, Hair form, F	acial form, Eye	form,	4	JRT	
	Nose form, Hair colour, Eye colour, Skin c	olour				
3	Evolutionary Biology: Identification of Apo	e Cranium (Dra	wing	4	JRT	
	and characteristics features): Gibbon, Ora	ing, Chimpanze	e,			
	Gorilla					

Semes	ster I (AY 2023-2024)	Period:		to		
Paper	: CC 2T (Introduction to Socio-cultural	Full Marks:	40	Cre	edit: 04	
Anthro	opology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1 Aim and Objectives of Social-Cultu	ral Anthropology.		9	SD	
2	Unit 1 Scope and relevance of Social-Cultural An	thropology.		9	SD	
3	Unit 1 Relationship of Social-Cultural Anthropology with other disciplines. History of nomenclature.		9	SD		
4	Unit 2 Concepts and definitions of society and culture. Different types of Groups and Institutions. Society and community		9	AS		
5	Unit 3 A study of Social Facts; Social System and Institution; Social Action, Social Stratification and Conflict.		9	AS		
6	Unit 4 Basic units of Society: Family; Marr Economic Organization; Political Organiza practices.	•	em;	9	SD	

Semes	ster I (AY 2023-2024)	Period:	to		
Paper	: CC 2P (Introduction to Socio Cultural	Full Marks: 20	Cre	Credit: 02	
Anthro	opology Lab) (Practical)				
Sl. No.	TOPICS			Class	Remark
				taken by	
1	Methods and Techniques of Social Anthropology The practical		I 9	AS	
	will include the following principal methods and techniques in				
	collection of data in Social Anthropology.				
2	Observation, Interview, Questionnaire and Schedule, Case		9	SD	
	study , Life history				

Curriculum Plan (ODD SEMESTER) (ANTHROPOLOGY Honours; CBCS)

Seme	ster III (AY 2023-2024)	Period:		to		
Paper	: CC5T (Tribes and Peasants in India)	Full Marks:	40	Cre	edit: 04	
(Theo						
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Anthropological Concept of Tribes - Proble definition and classification.	ems of nomenclat	ture,	6	AS	
2	Characteristics of Tribal Societies of the w Features of tribes in India	Characteristics of Tribal Societies of the world in general. Features of tribes in India		6	AS	
3	Tribes and Wider world - The history of tribal administration; Const	itutional safeguar	rds	6	AS	
4	Draft National Tribal Policy, Issues of accurand integration. Impact of development sprogramme on tribal life		tion	6	AS	
5	Anthropological Concept of Village The concept of peasantry			6	AS	
6	Approaches to the study of peasants – eccultural.	onomic, political a	and	6	AS	
7	Characteristics of Indian village: social organd changes.	anization; econor	my	6	AS	
8	Caste system and changes.			6	AS	
9	Ethnicity and Identity Issues Ethnicity issu Ethnicity and Ethnic Identity; Tribal and policy Identity issues	•	ts;	6	AS	

Semester III (AY 2023-2024)	Period:	to	
Paper: CC5P (Tribes and Peasants in India Lab)	Full Marks:	20	Credit: 02

(Pract	cical)			
Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Reading of Ethnography Student is required to read and analyse any two of the ethnographies (as listed in the reference section) and prepare a report based upon it. The report should clearly link up the study with the concept of tribe and peasantry and delineate clearly the concept used in the text.	9	AS	
2	Research questions/objectives of the study and their relevance. Theoretical schema. Methods and techniques used in the study Key findings and their significance in the context of the objectives of the study. Critical analysis of the finding on the basis of contemporary available resources.	9	AS	

	ster III (AY 2023-2024)	Period:	to		
	:: CC6T (Human Ecology: Biological &	Full Marks: 4	0 Cre	edit: 04	
	al Dimensions) (Theory)		T	T	T
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Biological Dimensions Concepts in Ecolo sensitivity adaptation, acclimation, accli abiotic component.	•	6	PR	
2	Methods of studying human ecology.		6	PR	
3	Adaptation to various ecological stresse their applicability to human populations	•	6	PR	
4	Impact of urbanization and industrializa	tion on Man	6	SD	
5	Cultural Dimensions - Culture as a tool of modes of human adaptation in pre-state and food gathering b. Pastoralism c. Shi	e societies. a. Hunting	6	SD	
6	Ecological themes of state formation: a. Cultural Adaptation (Mesolithic) b. Neol Indus Valley Civilization, Egyptian Civiliz	lithic revolution, c.	6	SD	
7	Agriculture and peasantry; Civilization a industrial societies	nd growth of urban ar	6 nd	SD	

Semester III (AY 2023-2024)	Period:	to	
Paper: CC6P (Human Ecology: Biological	Full Marks:	20	Credit: 02
&Cultural Dimensions Lab) (Practical)			

Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Biological Dimension - Size and Shape measurements – 1. Stature 2. Sitting Height 3. Body Weight 4. Total upper extremity length 5. Total lower extremity length 6. Nasal breadth 7. Nasal height 8. Bi acromian diameter 9. Bi-Illiac diameter	10	PR	
2	Biological Dimension - Size and Shape indices- 1. Body Mass Index 2. Ponderal Index 3. Relative sitting height 4. Relative upper extremity length 5. Relative total lower extremity length 6. Nasal inde	10	PR	
3	Cultural Dimensions Research Project on Biological and Culture aspects with reference to any environmental issues.	10	SD/AS	

Seme	ster III (AY 2023-2024)	Period:	to		
	: CC7T (Biological Diversity in Human	Full Marks: 40	Cre	edit: 04	
Popula	ations) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1 Concept of Biological Variability: Ra Hardy-Weinberg equilibrium. Major evolu Genetic Variation Genetic Polymorphism Biochemical and Molecular markers – Out Human Adaptation and Acclimatization (Control High Altitude and Cold Adaption. Control Bergman's and Glaser's rule	utionary forces for (Serological, t line); Concept of Out line). Examples	6	JRT	
2	Unit 2 Contribution of Risley, Guha, and S understanding ethnic elements in the Indits criticism.		6	PR	
3	Unit 3 Pre and Proto historic racial / ethni Linguistic classification of Indian population		6	JRT	
4	Unit 4 Role of Bio-cultural Factors Cultura factors influencing the diseases and nutrit Evolution of Human diet, biological persponders among different populations.	tional status.	6	PR	
5	Unit 5 Demographic Perspective Concept Anthropology; Sources of Demographic D Processes, Demographic profile of Indian growth structure; Concept of Inbreeding a Biological consequences of inbreeding	ata, Demographic populations and its	6	JRT	
6	Unit 6 Genetic diversity among Indian Pop	oulation	6	JRT	

Semes	ster III (AY 2023-2024)	Period:	to		
Paper	Paper: CC7P (Biological Diversity in Human Full Marks: 20			edit: 02	
Popula	Population Lab) (Practical)				
Sl. No.	TOPICS		CLASSES	Class	Remark
1	Quantitative traits: Anthropometric meas	uromonts 1 Staturo	ALLOTED 9	taken by PR	
1	2. Sitting Height 3. Body Weight 4. Total u		_	1 10	
	5. Total lower extremity length 6. Nasal b				
	8. Bi acromian diameter 9. Bi-Illiac diamet	•			
2.	Body Mass Index 2. Ponderal Index 3. R		9	JRT	
	4. Relative upper extremity length 5. Rela	• •		jiti	
	extremity length 6. Nasal index	tive total lower			
3	Polymorphic trait/Markers: ABO Blood Gr	roun (as natural	9	JRT	
	antigens), RhD Blood groups (as immune)1(1	
	participants (using standard techniques).	• ,			
	group subtypes and Rh Blood group haple	•			
4	Polygenic trait Concept of Dermatoglyphi	• •	9	JRT	
	Variation. Collection of Finger Prints (Five	•		,	
	and interpretation of basic finger pattern	• • • •			
	(Ulnar and Radial] and Arch] Indices: Danl				
	Furuhata's Index and Pattern Intensity ind	-			
	comparison) Collection and interpretation				
	Mortality Rate) of demographic data obta	•			
	secondary sources.	. ,			

Semes	ster III (AY 2023-2024)	Period:		to		
_	: SEC1T (Business and Corporate	Full Marks:	40	Cre		
Anthro	opology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Business and corporate Anthropology: History and subject matter		8	AS		
2	Applied anthropology in industry, application of the ethnography in business management		8	AS		
3	Anthropology and consumer behaviour			8	AS	
4	Globalization, international trade and anthropology			8	AS	
5	Techniques for Conducting Fieldwork for Organizations	Business		4	AS	

Semes	ster V (AY 2023-2024)	Period:		to		
-	: CC11T (Human Population genetics)	Full Marks:	40	Cre	edit: 04	
(Theo			П	ar 1 ac==	01	- ·
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Basic Genetics Outline of the landmarks genetics, Principles in human genetics, M Mendelian inheritance in man. Penetran Outline of Quantitative genetics, quantit inheritance, multifactorial and polygenic alleles, Co-dominance. Outline of the me genetics: Family method, Twin Method, Population genetics Exceptions to Mende Outline: Linkage (Sex linkage and sex infl Epistatis and genomic imprinting	lendelian Laws ce and expressi ative/complex inheritance, M thodology hum Cytogenetics, elian Inheritanc	: ivity ultiple nan	10	JRT	
2	Ecological Genetics and Polymorphism Co and Genotype Genetic Polymorphism: tra and balanced polymorphisms (Sickle cell Association of Polymorphism: Relationsh disease and non communicable disease v	ansient polymo trait and Malar ip of Communi	orphism ria) cable	10	JRT	
3	Equilibrium of allele frequency: Hardy-W Genotype and allele frequencies, Concep equilibrium, its applications and alternat perspective	t of Hardy-Wei	nberg	10	JRT	
4	Dynamics of Allele Frequency: Evolutional selection (pattern and mechanism), Gene and founder effect), Gene flow/migration (inbreeding co-efficient and its genetic co	etic drift (bottle n, inbreeding		10	JRT	
5	Population structure and admixture in his Concept of Random and non-random manegative assortative mating), heritability disequilibrium, Concept of genetic market heterozygosity (Polymorphism Informati Anthropology, Disease association.	ting (positive a , linkage ers utility:	nd	10	JRT	
6	Human evolutionary genetics Concept of Development (Evo-Devo), Outline of Evo From Mendel to molecules: A brief histo- genetics. Human-Ape comparisons.	lutionary Bioloยู		10	JRT	

Semes	ster V (AY 2023-2024)	Period:	to				
Paper	Paper: CC11P (Human Population Genetics Full Marks: 20 Credit: 02						
Lab) (Lab) (Practical)						
Sl. No.	TOPICS	•	CLASSES	Class	Remark		
			ALLOTED	taken by			

1	Blood group typing- ABO blood group (A1, A2, B, O), MN Blood Group and Rh (D) (At least 10 participants. Allele frequency estimation. Heterozygosity score. Testing of Hardy Weinberg equilibrium.	3	JRT	
2	Color Blindness: Deutan and Protan type. Estimation of carriers. Estimation of male female ratio (at least 20 participants)	3	JRT	
3	Identification of Sex Chromatin (Inactivated X Chromosomes): one male and one female, 50 cells each	3	JRT	
4	PTC taste testing ability: At least 20 participants. Allele frequency estimation.	3	JRT	

	ster V (AY 2023-2024)	Period:	to		
_	: CC12T (Anthropology in Practice)	Full Marks: 40	Cre	edit: 04	
(Theo	ry) TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Academic Anthropology Academics and Practitioners: Differences, Structure, Activities, Controversies and Issues: Applied Anthropology, Action Anthropology and Development Anthropology.			AS	
2	Role of Anthropology in Development Anthropology and Public Policy, Need Assessment and Community Development, Anthropology of NGO's, Management Anthropology, Environment and Community Health, Social and economic sustainability, Cultural resource management		12	AS	
3	Future Dynamics in Anthropology Trends Anthropology of Tourism, Anthropology I Designing And Fashion, Visual Anthropolo	n Census operation;	12	AS	
4	Constitutional Perspective and Human Rights Constitutional Provisions, Evaluation, Planning and Development of Indian Populations; Human Rights, Interrelationships of rights and duties: Harmony and Conflict, Protection and enforcement of human rights and duties, National and State Human Rights Commission and other grievance redressal mechanism, Human rights of special category and marginal groups, Emerging trends of human rights respective to terrorism, environment and globalization		12	SD	
5	Biosocial anthropology in practice Bio-sochuman development at national and inte application of conceptual framework of Fin judicial settings both criminal and civil, and relationship between population groaspects of culture such as means of subsicomplexity, social stratification and political social stratification and political social stratification.	rnational level, forensic Anthropology Population Dynamics wth and various stence, kinship, social	12	SD	

social counselling of an individual or population		

Seme	ster V (AY 2023-2024)	Period:		to		
Paper	: CC12P (Anthropology in Practice Lab)	Full Marks:	20	Cre	edit: 02	
(Pract	tical)					
Sl. No.	No. TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Write a project on constitutional provisions or evaluation of			3	SD	
	any development project/report.					
2	Write a project on Religious Tourism / Tribal Tourism / Health			3	SD	
	Tourism / Fashion / Human Rights / Ecoto	urism.				
3	Write a project on the demographic profi	le from seconda	ary	3	SD	
	data.					
4	Collect data on bio-social problem and design counselling and		3	SD		
	give the analysis and interpretation.					

Seme	ster V (AY 2023-2024)	Period:	to		
_	: DSE1 (Sports and Nutritional	Full Marks: 40	Cre		
	opology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit I: Anthropology of sports- Physical fitness, component of physical fitness			PR	
2	Unit II: Physical conditioning, training-techniques and physiological effects, environmental effects on physical performance: effect of heat stress, cold stress and high altitude on physiological response and performance.		9	PR	
3	Unit III: Body composition and Athletes, sports selection and monitoring		9	PR	
4	Unit IV: Human biological variability, health and nutrition; doping and performance; cultural constructions and physiologic implications of food across time, space and society; an integrated bio-behavioural perspective towards food preference.		9	PR	

Semester V (AY 2023-2024)	Period:	to	
Paper: DSE 1 (Sports and Nutritional	Full Marks:	20	Credit: 02
Anthropology Practical) (Practical)			

Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Assessment of daily nutrient intake	12	PR	
2	Evaluate association of nutritional status and physical performance	12	PR	
3	Demonstrate cultural perspective for preference of specific food of a population	12	PR	

Seme	ster V (AY 2023-2024)	Period:		to		
	: DSE2 (Paleoanthropology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit I: Dating methods, geological time scale, taphonomy and interpretation of the paleontological and archaeological records, taxonomic and chronological problems of fossils records.		6	AS		
2	Unit II: Primate speciation and extinctions perspective, adaptive primate radiation, of somatic evolution.			6	AS	
3	Unit III: Evolutionary biology: Origins and age technology (Human origins: Developm fossilized evidence of Australopithecines, (Zinjanthropus), Homo habilis, Homo erec sapiens, prehistoric hunter-gatherers, mo communities, emergence of prehistoric per	nent, distribution a Paranthropus tus, Archaic H. dern pastoral	nd	6	AS	
4	Unit IV: Primate and Non-Primate Models Behaviour; hominization process- Evolution bipedalism	•	an	6	AS	
5	Unit V: Palaeodemography- reconstruction patterns from skeletal analysis, determined variables in prehistoric populations and perpopulation growth, theory and techniques paleodemography, methodological issues demographic structure, demographic mode their interpretation	ition of demograph ost-neolithic s in for reconstructing		6	AS	
6	Unit VI. Palaeopathology- bioarchaeologic disease; effects of agriculture, urbanization health and disease; colonization and disease emphasis on the New World; dispersion of molecular and morphological patterns of	n and slavery on ase with special f modern humans	-	6	AS	

Semester V (AY 2023-2024) Period:						
Paper	Paper: DSE 2 (Paleoanthropology (Practical)) Full Marks: 20			Credit: 02		
(Practical)						
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Comparative primete esteelegy			9	SD/AS	
	Comparative primate osteology			9		
2	Description and identification of the disarticulated skeleton of			9	SD/AS	
	non-human primates					
3	Identification and description of fossil casts		9	SD/AS		
4	Excursion to a site for seven days for collection of fossil		9	SD/AS		
	material and its report					

Curriculum Plan (ODD SEMESTER)

(Botany Honours; CBCS)

Semes	ster I (AY 2022-2025)	Period:	to		
Paper:	CC 1T(Phycology and Microbiology) (Theory)	Full Marks: 40+15	C	Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to microbial world: Microbial nutrition, growth and metabolism. Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases. Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).			SkMd Ismail Al Amin	
2	Unit 2: Viruses Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV).			SkMd Ismail Al Amin	
3	Unit 3: Bacteria Discovery, general characteristics; Types- archaebacteria, eubacteria, wall-less forms (mycoplasma and spheroplasts); Cell structure; Nutritional types; Reproduction- vegetative, asexual and recombination (conjugation, transformation and transduction).			SkMd Ismail Al Amin	
4	Unit 4: Algae General characteristics; Ec range of thallus organization; Cell structur wall, pigment system, reserve food (of only g syllabus), flagella; methods of reproductions system of Fritsch, and evolutionary classific groups) and Van – den Hoek et.al(1982); Sig important phycologists (F.E. Fritsch, G.M. S Desikachary, H.D. Kumar, M.O.P. Iyengar environment, agriculture, biotechnology and	e and components; cell groups represented in the groups represented in the groups represented in the gration of Lee (only upto gnificant contributions of Smith, R.N. Singh, T.V. h). Role of algae in the	(11 lectures)	Susanta Kumar Maity	
5	Unit 5: Cyanophyta and Xanthophyta Ec Range of thallus organization; Cell st Morphology and life-cycle of Nostoc and Van	cructure; Reproduction,	(8 lectures)	Susanta Kumar Maity	
6	Unit 6: Chlorophyta and Charophyta Occurrence; Range of thallus organiz Reproduction. Morphology and life-cycle Volvox, Oedogonium, Coleochaete, Chara. E of Prochloron.	ation; Cell structure; es of <i>Chlamydomonas</i> , volutionary significance	(8 lectures)	Susanta Kumar Maity	
7	Unit 7: Phaeophyta and Rhodophyta: Char Range of thallus organization; Cell st Morphology and life-cycles of <i>Ectocarpus</i> , F	ructure; Reproduction.	(12 lectures)	Susanta Kumar Maity	

Semes	ster I (AY 2022-2025)	Period:		to		
Paper: CC 1P (Phycology and Microbiology) (Practical)		Full Marks:	20	Credit:02		
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark

1	Microbiology 1. Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle. 2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule. 3. Gram staining. 4. Endospore staining with malachite green using the (endospores taken from soil bacteria). 5. Study of bacteria from root nodules/Curd sample.	20	SkMd Ismail Al Amin
2	Phycology Study of vegetative and reproductive structures of Nostoc, <i>Chlamydomonas</i> (electron micrographs), Volvox, <i>Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus</i> and <i>Polysiphonia, Procholoron</i> through electron micrographs, temporary preparations and permanent slides.	20	Susanta Kumar Maity

Seme	ster I (AY 2022-2025)	Period:	to		
-	: CC 2T (Biomolecules and Cell gy) (Theory)	Full Marks: 40+15		Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biomolecules: Types and significations of water; pH are Carbohydrates: Nomenclature and class Monosaccharides; Disaccharides; Oligo polysaccharides. Lipids: Definition and and structural lipids; Fatty acids structure. Essential fatty acids; Triacylglycerols structures; Phosphoglycerides. Proteins acids; Levels of protein structure-prima and quarternary; Protein denaturation and proteins. Nucleic acids: Structure of nitrand function of nucleotides; Types of RNA; A, B, Z types of DNA; Types of RNA;	and buffers. diffication; dosaccharides and major classes of storage re and functions; tructure, functions and difficulty: dif	(20 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Bioenergenetics: Laws of therm free energy, endergonic and exergonic reactions, redox reactions. ATP: structu currency molecule.	reactions, coupled	(4 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Enzymes: Structure of enzyme: cofactors, coenzymes and prosthetic greenzymes; Features of active site, substramechanism of action (activation energy induced - fit theroy), Michaelis – Mente inhibition and factors affecting enzyme	oup; Classification of ate specificity, , lock and key hypothesis, en equation, enzyme	(6 lectures)	Dr. Nilay Kumar Maitra	
4	Unit4: The cell: Cell as a unit of structu	re and function:	(4	Dr. Nilay	

	Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).	lectures)	Kumar Maitra
5	Unit 5: Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.	(4 lectures)	Dr. NilayKumar Maitra
6	Unit 6: Cell organelles: Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export ofproteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes	(16 lectures)	Dr. Nilay Kumar Maitra
7	Unit 7: Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.	(6 lectures)	Dr. Nilay Kumar Maitra

Semes	ster I (AY 2022-2025)	Period:	to		
-	CC 2P (: Biomolecules and Cell gy) (Practical)	Full Marks: 20	C	redit:02	
Sl. No.	TOPICS	<u>l</u>	CLASSES ALLOTED	Class taken by	Remark
1	1. Qualitative tests for carbohydrates, re reducing sugars, lipids and proteins.	ducing sugars, non-	(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Study of plant cell structure with the mount of Onion/Rhoeo /Crinum.	nelp of epidermal peel		Dr. Nilay Kumar Maitra	
3	3. Demonstration of the phenomenon of streaming in Hydrilla leaf.	protoplasmic		Dr. Nilay Kumar Maitra	
4	4. Measurement of cell size by the techn	ique of micrometry.		Dr. Nilay Kumar Maitra	
5	5. Counting the cells per unit volume with haemocytometer. (Yeast/pollen grains).	th the help of		Dr. Nilay Kumar Maitra	
6	6. Study of cell and its organelles with t micrographs.	he help of electron		Dr. Nilay Kumar Maitra	

7	7. Cytochemical staining of: DNA- Feulgen Actocarmin and AcetoOrcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	Dr. Nilay Kumar Maitra
8	8. Study the phenomenon of plasmolysis and deplasmolysis.	Dr. NilayKumar Maitra
9	9. Study the effect of organic solvent and temperature on membrane permeability.	Dr. Nilay Kumar Maitra
10	10. Study different stages of mitosis and meiosis.	Dr. Nilay Kumar Maitra

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	eter II (AY 2022-2025)	Period:	to		
-	CC 3T (Mycology and pathology) (Theory)	Full Marks: 40	(Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to true fungi: General of Affinities with plants and animals; Thallus wall composition; Nutrition; Classification.	organization; Cell	(6 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Chytridiomycota and Zygomycota: features; Ecology and significance; Thallus Reproduction; Life cycle with reference to Rhizopus.	organisation;	(5 lecture)	Dr. Nilay Kumar Maitra	
3	Unit 3: Ascomycota: General characteristic fruiting bodies); Ecology; Life cycle, Heter parasexuality; Life cycle and classification Saccharomyces, Aspergillus, Penicillium, Annuospora and Peziza.	okaryosis and with reference to	(10 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Basidiomycota: General characteriscycle and Classification with reference to bwheat Puccinia (Physiological Specializations smut (symptoms only), Agaricus; Bioluminand Mushroom Cultivation with special refembashroom.	lack stem rust on on), loose and covered sescence, Fairy Rings	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Allied Fungi: General characteristic molds, Classification; Occurrence; Types of fruiting bodies.		(3 lectures)	Dr. Nilay Kumar Maitra	
6	Unit 6: Oomycota: General characteristics; and classification with reference to Phytoph		(4 lectures)	Dr. Nilay Kumar Maitra	
7	Unit 7: Symbiotic associations Lichen: – O characteristics; Growth forms and range of Nature of associations of algal and fungal p Reproduction; Mycorrhiza-Ectomycorrhiza	thallus organization; partners;	(4 lectures)	Dr. Nilay Kumar Maitra	

	and their significance.		
8	Unit 8: Applied Mycology: Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.	(10 Lectures)	Dr. Nilay Kumar Maitra
9	Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine.	(10 lectures)	Dr. Nilay Kumar Maitra
10	Bacterial diseases: – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.	(10 lectures)	SkMdIsmail Al Amin

Semester II (AY 2022-2025) Period: to					
-	: CC 3P(Mycology and pathology)(Practical)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Introduction to the world of fungi (Unicellu coenocytic/septate mycelium, ascocarps&basical)		(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Rhizopus: study of asexual stage from temp sexual structures through permanent slides.	porary mounts and		Dr. Nilay Kumar Maitra	
3	3. Aspergillus and Penicillium: study of asexu temporary mounts. Study of Sexual stage from slides/photographs.	-		Dr. Nilay Kumar Maitra	
4	4. Peziza: Ascobulus sectioning through ascoo	carp.		Dr. Nilay Kumar Maitra	
5	5. Alternaria: Specimens/photographs and ten	nporary mounts.		Dr. Nilay Kumar Maitra	
6	6. Puccinia: Herbarium specimens of Black S and infected Barberry leaves; sections/ mount and permanent slides of both the hosts.			Dr. Nilay Kumar Maitra	
7	7. Agaricus: Specimens of button stage and fu sectioning of gills of Agaricus, fairy rings and mushrooms to be shown.			Dr. Nilay Kumar Maitra	
8	8. Study of phaneroplasmodium from actual s photograph. Study of Stemonitis sporangia.	pecimens and /or		Dr. Nilay Kumar Maitra	

9	9. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.		Dr. Nilay Kumar Maitra	
10	10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)		Dr. Nilay Kumar Maitra	
11	11. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.	(10 lectures)	SkMd Ismail Al Amin	

Semester II (AY 2022-2025) Period:		Period:	to		
Paper	: CC 4T (Archegoniate) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction: Unifying features of Transition to land habit; Alternation of go	_	(4 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Bryophytes: General characteristic land habit; Classification; Range of thallow		(6 lectures)	SkMd Ismail Al Amin	
3	Unit 3: Type Studies:- Bryophytes Classifamily), morphology, anatomy and reproduction and explanatia; Pogonatum, Reproduction and explanatia; Pogonatum, Plagichasma Anthoco (developmental stages not included). Eco importance of bryophytes with special responses.	duction of Riccia, Sphagnum and volutionary trends in eros and Funaria blogical and economic	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Pteridophytes: General characteri Early land plants (Cooksonia and Rhynia		(6 lectures)	Susanta Kumar Maity	
5	Unit 5: Type Studies-: Pteridophytes Clarfamily), morphology, anatomy and reproselaginella, Equisetum and Pteris (Devel to be included). Apogamy, and apospory, habit, telome theory, stelar evolution; Ecception importance.	duction of Psilotum, opmental details not heterosporyandseed	(14 lectures)	Susanta Kumar Maity	
6	Unit 6: Gymnosperms: General character (up to family), morphology, anatomy and Cycas, Pinus and Gnetum (Development included); Ecological and economic impositional control of the control	l reproduction of al details not to be	(18 lectures)	Susanta Kumar Maity	

Semes	ster II (AY 2022-2025)	Period:	to		
Paper	CC 4P (Archegoniate) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Riccia – Morphology of thallus.		(15 lectures)		
2	vertical section of thallus through Gemma cup, whol temporary slides), vertical section of Antheridiophor	archantia- Morphology of thallus, whole mount of rhizoids & Scales, cal section of thallus through Gemma cup, whole mount of Gemmae (all sorary slides), vertical section of Antheridiophore, Archegoniophore, itudinal section of Sporophyte (all permanent slides).			
3	3. Anthoceros- Morphology of thallus, dissection of stomata, spores, pseudoelaters, columella) (temporar of thallus (permanent slide).			SkMd Ismail Al Amin	
4	4. Pellia, Porella- Permanent slides.			SkMd Ismail Al Amin	
5	5. Sphagnum- Morphology of plant, whole mounts of only).	of leaf (permanent slide		SkMd Ismail Al Amin	
6	6. Funaria- Pogonatum/ Polytrichum Morphology, v rhizoids, operculum, peristome, annulus, spores (ten permanent slides showing antheridial and archegoni section of capsule and protonema.	nporary slides);		SkMd Ismail Al Amin	
7	7. Psilotum- Study of specimen, transverse section of slide).	f synangium (permanent	(15 lectures)	Susanta Kumar Maity	
8	8. Selaginella- Morphology, whole mount of leaf wi section of stem, whole mount of strobilus, whole mount of megasporophyll (temporary slides), longitudina (permanent slide).	ount of microsporophyll		Susanta Kumar Maity	
9	9. Equisetum- Morphology, transverse section of int section of strobilus, transverse section of strobilus, v sporangiophore, whole mount of spores (wet and dry transverse section of rhizome (permanent slide).	whole mount of		Susanta Kumar Maity	
10	10. Pteris- Morphology, transverse section of rachis, sporophyll, wholemount of sporangium, whole mou slides), transverse section of rhizome, whole mount organs and young sporophyte (permanent slide).	nt of spores (temporary		Susanta Kumar Maity	
11	11. Cycas- Morphology (coralloid roots, bulbil, leaf microsporophyll, transverse section of coralloid root rachis, vertical section of leaflet, vertical section of mount of spores (temporary slides), longitudinal sec section of root (permanent slide).	t, transverse section of microsporophyll, whole		Susanta Kumar Maity	
12	12. Pinus- Morphology (long and dwarf shoots, who male and female cones), transverse section of Needl stem, longitudinal section of / transverse section of of microsporophyll, whole mount of Microspores (to longitudinal section of female cone, tangential longitudinal sections stem (permanent slide).	e, transverse section of male cone, whole mount emporary slides),		Susanta Kumar Maity	
13	13. Gnetum- Morphology (stem, male & female con stem, vertical section of ovule (permanent slide)	es), transverse section of		Susanta Kumar Maity	

14	14. Botanical excursion	Susanta	
		Kumar	
		Maity	
		-	

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

	(Botai	ny Honours; CBCS)			
Sen	nester III (AY 2022-2025)	Period: to			
	eer: CC5T (Anatomy of Angiosperms)	Full Marks: 40	Credit:04		
Sl. N o.	TOPICS		CLASSE S ALLOTE D	Class taken by	Rema rk
1	Unit 1: Introduction and scope of Plant Ana systematics, forensics and pharmacognosy.		(4 Lectures)	Susanta Kumar Maity	
2	Unit 2: Structure and Development of Plant plant body: The three tissue systems, types of plant body: polarity, cytodifferentiation a embryogenic development, Root-stem transconcept.	of cells and tissues. Development and organogenesis during	(6 Lectures)	Susanta Kumar Maity	
3	Unit 3: Tissues Classification of tissues; Sin phylogeny); cytodifferentiation of tracheary Pits and plasmodesmata; Wall ingrowths an incrustation, Ergastic substances. Hydathod laticifers.	elements and sieve elements; and transfer cells, adcrustation and	(12Lectur es)	Susanta Kumar Maity	
4	Unit 4: Apical meristems: Evolution of con apex (Apical cell theory, Histogen theory, Terristematic residue, cytohistological zona Structure of dicot and monocot stem. Origin diversity in size and shape of leaves; Struct Kranz anatomy. Organization of root apex (theory, Korper-Kappe theory); Quiescent con dicot and monocot root; Endodermis, exode	Funica Corpus theory, continuing tion); Types of vascular bundles; n, development, arrangement and ure of dicot and monocot leaf, (Apical cell theory, Histogen entre; Root cap; Structure of	(15 Lectures)	Susanta Kumar Maity	
5	Unit 5: Vascular Cambium and Wood Struct activity of cambium; Secondary growth in a secondary growth in Bignonia, Boerhaavia, Axially and radially oriented elements; Typ Cyclic aspects and reaction wood; Sapwood diffuse porous wood; Early and late wood, to Development and composition of periderm,	root and stem. Anomalous Aristolochia and Dracaena. ses of rays and axial parenchyma; d and heartwood; Ring and tyloses; Dendrochronology.	(15 Lectures)	Susanta Kumar Maity	
6	Unit 6: Adaptive and Protective Systems Epericuticular waxes, trichomes(uni-and mult nonglandular, two examples of each), stoma and incrustation; Anatomical adaptations of Mechanical tissue – distribution and significant	icellular, glandular and ata (classification); Adcrustation f xerophytes and hydrophytes.	(8 Lectures)	SusantaKu mar Maity	

Semes	ster III (AY 2022-2025)	Period:	to		
Paper: CC5P (Anatomy of Angiosperms) (Practical)		Full Marks: 20		Credit:02	
Sl. No.	TOPICS		CLASSE S ALLOTE D	Class taken by	Remark
1	Study of anatomical details through permanent s mounts/ macerations/museum specimens with the examples. Apical meristem of root, shoot and vascular can	help of suitable	(20 Lectur es)	Susanta Kumar Maity	
	 Distribution and types of parenchyma, collenchy Xylem: Tracheary elements-tracheids, vessel eleperforation plates; xylem fibres. Wood: ring porous; diffuse porous; tyloses; heat Phloem: Sieve tubes-sieve plates; companion ce Epidermal system: cell types, stomata types; tricand glandular Root: monocot, dicot, secondary growth. Stem: monocot, dicot - primary and secondary glenticels. Leaf: isobilateral, dorsiventral, C4 leaves (Krath. Adaptive Anatomy: xerophytes, hydrophytes. Secretory tissues: cavities, lithocysts and latici 	ements; thickenings; rt- and sapwood. ells; phloem fibres. chomes: non-glandular growth; periderm; nz anatomy).			

Paper: CC6T (Economic Botany) (Theory) Full Marks: 40 TOPICS No. Unit 1: Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. Unit 2: Cereals: Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets. Unit 3: Legumes: Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and ecosystem.	CLASSES ALLOTED (60 lectures)	Class taken by Dr. Nilay Kumar Maitra	Remark
No. 1 Unit 1: Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. Unit 2: Cereals: Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets. Unit 3: Legumes: Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and	ALLOTED (60	Dr. Nilay Kumar	Remark
importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. Unit 2: Cereals: Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets. Unit 3: Legumes: Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and	`	Nilay Kumar	
Unit 4: Sources of sugars and starches: (Morphology cultivation, management and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation & uses. Unit 5: Spices: Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper Unit 6: Beverages: Tea, Coffee (morphology, processing & uses) Unit 7: Sources of oils and fats: General description, classification, extraction, their uses and health implications groundnut, coconut, linseed, soybean, mustard and coconut (Botanical name, family & uses). Essential Oils: General account, extraction methods, comparison with fatty oils & their uses. Unit 8: Natural Rubber: Para-rubber: tapping, processing and uses. Unit 9: Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis; Tobacco (Morphology, processing, uses and health hazards). Unit 10: Timber plants: General account with special reference to teak and pine. Unit 11: Fibers: Classification based on the origin of fibers; Cotton, Coir			

Semester III (AY 2022-2025) Period:		Period:	to		
Paper:	CC6P (Economic Botany) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No.	1. Cereals: Wheat (habit sketch, L. S/T.S. gr chemical tests) Rice (habit sketch, study of pmicro-chemical tests). 2. Legumes: Soybean, Groundnut, (habit, frechemical tests). 3. Sources of sugars and starches: Sugarcane micro-chemical tests), Potato (habit sketch, show localization of starch grains, w.m. startests). 4. Spices: Black pepper, Fennel and Clove (5. Beverages: Tea (plant specimen, tea leave beans). 6. Sources of oils and fats: Coconut- T.S. nu seeds; tests for fats in crushed seeds. 7. Essential oil-yielding plants: Habit sketch and Eucalyptus (specimens/photographs). 8. Rubber: specimen, photograph/model of t products. 9. Drug-yielding plants: Specimens of Digitation Tobacco: specimen and products of Tobatic Tobacco: specimen and products of Tobatic Testona, Pinus: Specimen, Section 12. Fiber-yielding plants: Cotton (specimen,	paddy and grain, starch grain paddy and grain, starch grain uit, seed structure, microec (habit sketch; cane juicetuber morphology, T.S. tuber ch grains, micro-chemical habit and sections). es), Coffee (plant specimen, at, Mustard–plant specimen, at, Mustard–plant specimen, apping, samples of rubber alis, Papaver and Cannabis. acco.	(24 lectures)	Dr. Nilay Kumar Maitra	

Semes	ster III (AY 2022-2025)	Period:		to		
Paper:	CC7T (Genetics) (Theory)	Full Marks:	40	Cr	edit:04	
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian genetics and its extension Mendof inheritance; Chromosome theory of inheritance chromosomes; Probability and pedigree analysis; I codominance; Multiple alleles, Lethal alleles, Epis Recessive and Dominant traits, Penetrance and Ex Polygenic inheritance.	Autosomes and s Incomplete dominations, Pleiotropy,	ex ance and	(16 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Extrachromosomal Inheritance Chloroplas Four o'clock plant; Mitochondrial mutations in ye- coiling in snail; Infective heredity- Kappa particles	ast; Maternal effec		(6 lectures)	SkMd Ismail Al Amin	

3	Unit 3: Linkage, crossing over and chromosome mapping Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.	(12 lectures)	SkMd Ismail Al Amin
4	Unit 4: Variation in chromosome number and structure Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy	(8 lectures)	SkMd Ismail Al Amin
5	Unit 5: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation.DNA repair mechanisms.	(6 lectures)	SkMd Ismail Al Amin
6	Unit 6: Fine structure of gene Classical vs molecular concepts of gene; Cis- Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.	(6 lectures)	SkMd Ismail Al Amin
7	Unit 6. Population and Evolutionary Genetics Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	(6 lectures)	SkMd Ismail Al Amin

Semes	ster III (AY 2022-2025)	Period:	to		
Paper	: CC7P (Genetics) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Demonstration on pretreatment, fixation squash and smear preparation.	tration on pretreatment, fixation, staining and smear preparation.		SkMd Ismail Al Amin	
2	2. Study of Mitosis from Onion / Garlic /	Lentil root.		SkMd Ismail Al Amin	
3	3. Study of Meiosis with pollen mother cell (PMC) of Onion / Solanum / Datura by smear preparation.			SkMd Ismail Al Amin	
4	4. Mendel's laws through seed ratios. Laboratory exercises in probability and chi-square.			SkMd Ismail Al Amin	
5	5. Chromosome mapping using point test	t cross data.		SkMd Ismail Al Amin	
6	6. Pedigree analysis for dominant and recessex linked traits	cessive autosomal and		SkMd Ismail Al Amin	
7	7. Incomplete dominance and gene interaratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:	_		SkMd Ismail Al Amin	
8	8. Blood Typing: groups & Rh factor.			SkMd Ismail Al Amin	

9	9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	SkMd Ismail Al Amin
10	10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.	SkMd Ismail Al Amin
11	11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe	SkMd Ismail Al Amin

Semester III (AY 2022-2025)		Period:	to		
Paper	: SEC1T (Biofertilizers) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: General account about the microbes was Rhizobium – isolation, identification, mass massed inoculants, Actinorrhizal symbiosis.		(4 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Azospirillum: isolation and mass mul based inoculant, associative effect of different microorganisms. Azotobacter: classification, or response to Azotobacter inoculum, maintenant multiplication.	t characteristics – crop	(8 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Cyanobacteria (blue green algae), Azazollae association, nitrogen fixation, factors green algae and Azolla in rice cultivation.		(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Mycorrhizal association, types of myctaxonomy, occurrence and distribution, phosp and yield – colonization of VAM – isolation production of VAM, and its influence on grouplants.	ohorus nutrition, growth and inoculum	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Organic farming – Green manuring an Recycling of biodegradable municipal, agricu wastes – biocompost making methods, types vermicomposting – field Application.	altural and Industrial	(6 lectures)	Dr. Nilay Kumar Maitra	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Bottiny Honours, CBCS)						
Semes	ster IV (AY 2022-2025)	Period:	to			
Paper	CC8T (Molecular Biology) (Theory)	Cull Marks:	Credi	t:		
Sl. No.			CLASSES ALLOTED	Class taken by	Remark	
1	Unit- 1: Nucleic acids: Carriers of genetic information Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey		(60	SkMd Ismail		

	& Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.	lectures)	Al Amin
2	Unit -2. The Structures of DNA and RNA / Genetic Material DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA-Prokaryotes, Viruses, Eukaryotes.RNA Structure-Organelle DNA mitochondria and chloroplast DNA.TheNucleosomeChromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.		
3	Unit- 2:The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.		
4	Unit- 3: Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)		
5	Unit 4: Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes:transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.	(60 lectures)	Susanta Kumar Maity
6	Unit 5: Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.		
7	Unit 6: Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNAsynthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.		

Seme	ster IV (AY 2022-2025)	Period:	to		
Paper	Paper: CC8P (Molecular Biology) (Practical) Full Marks:		Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Preparation of LB medium and raising E.Coli. Isolation of genomic DNA from <i>E.Coli</i> .		(30 SkM Isma Al A		
	3. DNA isolation from cauliflower head.		_	&	
	4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.			Susanta	
	5. Study of DNA replication mechanisms through circle, Theta replication and semi-discontinuous r				
	6. Study of structures of prokaryotic RNA polym polymerase II through photographs	erase and eukaryotic RNA			
	7. Photographs establishing nucleic acid as genet: Stahl's, Avery et al, Griffith's, Hershey & Chase experiments)	•			
	8. Study of the following through photographs: A	ssembly of Spliceosome	1		

machinery; Splicing mechanism in group I & group II introns; Ribozyme and		
Alternative splicing.		

Semes	ster IV (AY 2022-2025)	Period:	to		
-	CC9T (Plant Ecology and geography) (Theory)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction Basic concepts; Levels of organization. Inter-relationships between the living world and the environment, the components and dynamism, homeostasis.		(60 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Soil Importance; Origin; Formation Physical; Chemical and Biological composition of climate in soil development.	•		Dr. Nilay Kumar Maitra	
3	Unit 3: Water Importance: States of water Atmospheric moisture; Precipitation type hail, dew); Hydrological Cycle; Water in	s (rain, fog, snow,		Dr. Nilay Kumar Maitra	
4	Unit 4: Light, temperature, wind and fire adaptations of plants to their variation.	Variations;		Dr. Nilay Kumar Maitra	
5	Unit 5: Ecosystems Structure; Processes; organisation; Food chains and Food webs pyramids.	-		Dr. Nilay Kumar Maitra	
6	Unit 6: Population ecology Characteristic .Ecological Speciation	s and Dynamics		Dr. Nilay Kumar Maitra	
7	Unit 7: Plant communities Concept of ecc Habitat and niche; Characters: analytical Ecotone and edge effect; Dynamics: succ types; climax concepts.	and synthetic;		Dr. Nilay Kumar Maitra	
8	Unit 8: Biotic interactions Trophic organi of energy, autotrophy, heterotrophy; symcommensalism, parasitism; food chains a pyramids; biomass, standing crop.	biosis,		Dr. Nilay Kumar Maitra	
9	Unit 9: Functional aspects of ecosystem I of energy flow; Production and productive efficiencies; Biogeochemical cycles; Cyc	ity; Ecological		Dr. Nilay Kumar Maitra	

Nitrogen and Phosph	orus.		
of tolerance; Endem biomes (one each fro	mphy Principles; Continental drift; Theory sm; Brief description of major terrestrial m tropical, temperate & tundra); ivision of India; Local Vegetation.	Dr. Nilay Kumar Maitra	

Seme	ster IV (AY 2022-2025)	Period:	to		
-	: CC9P (Plant Ecology and geography) (Practical)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to meast variables: Soil thermometer, maximu thermometer, anemometer, psychromegauge and lux meter.	m and minimum	(36 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH of various so meter, universal indicator/Lovibond	• •		Dr. Nilay Kumar Maitra	
3	3. Analysis for carbonates, chlorides, organic matter and base deficiency fr	•		Dr. Nilay Kumar Maitra	
4	4. two soil samples by rapid field test	ts.		Dr. Nilay Kumar Maitra	
5	5. Determination of organic matter of Walkley& Black rapid titration	f different soil samples by		Dr. Nilay Kumar Maitra	
6	6. method			Dr. Nilay Kumar Maitra	
7	7. Comparison of bulk density, poros of water in soils of three habitats.	ity and rate of infiltration		Dr. Nilay Kumar Maitra	
8	8. Determination of dissolved oxyger polluted and unpolluted sources.	n of water samples from		Dr. Nilay Kumar Maitra	
9	9. (a). Study of morphological adapta xerophytes (four each). (b). Study of following: Stem parasite (Cuscuta), F Epiphytes, Predation (Insectivorous p	biotic interactions of the Root parasite (Orobanche)		Dr. Nilay Kumar Maitra	
10	10. Determination of minimal quadra herbaceous vegetation in the college curve method (species to be listed).	-		Dr. Nilay Kumar Maitra	
11	11. Quantitative analysis of herbaceo college campus for frequency and cor Raunkiaer's frequency distribution la	mparison with		Dr. Nilay Kumar Maitra	

12	12. Quantitative analysis of herbaceous vegetation for density	Dr. Nilay
	and abundance in the college campus. 13. Field visit to familiarise students with ecology of different sites.	Kumar Maitra

Semes	ster IV (AY 2022-2025)	Period:	to		
Paper	: CC10T (Plant Systematics) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Significance of Plant systematics Intr Plant identification, Classification, Nomencle palynology, cytology, phytochemistry and m inventory; Functions of Herbarium; Importar gardens of the world and India; Virtual herba Documentation: Flora, Monographs, Journals and Multi-access.	ature. Evidences from tolecular data. Field nt herbaria and botanical arium; E-flora;	(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Taxonomic hierarchy Concept of taxa species); Categories and taxonomic hierarchy (taxonomic, biological, evolutionary).			Susanta Kumar Maity	
3	Unit 3: Botanical nomenclature Principles and names; Typification, author citation, valiof names, principle of priority and its limitation.	id publication, rejection		Susanta Kumar Maity	
4	Unit 4: Systems of classification Major contraction Theophrastus, Bauhin, Tournefort, Linnaeus, Bessey, Hutchinson, Takhtajan and Cronquis systems of Bentham and Hooker (upto series (upto series); Brief reference of Angiosperm (APG III) classification.	, Adanson, de Candolle, st; Classification s) and Engler and Prantl		Susanta Kumar Maity	
5	Unit 5: Biometrics, numerical taxonomy and Variations; OTUs, character weighting and c Phenograms, cladograms (definitions and dif	oding; Cluster analysis;		Susanta Kumar Maity	
6	Unit 6: Phylogeny of Angiosperms Terms an and advanced, homology and analogy, parall monophyly, Paraphyly, polyphyly and clades of angiosperms; Co-evolution of angiosperm of illustrating evolutionary relationship (phyloladogram).	elism and convergence, s). Origin and evolution is and animals; Methods		Susanta Kumar Maity	

Semes	ster IV (AY 2022-2025)	Period:	to		
Paper	CC10P (Plant Systematics) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of vegetative and floral characters of the following		(36	Susanta Kumar	

2 2. Field visit (local) – Subject to grant of funds from the university. 3 3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book). Susanta Kumar Maity Susanta Kumar Maity		families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): 1. Ranunculaceae - Ranunculus, Delphinium. 2. Brassicaceae - Brassica, Alyssum / Iberis. 3. Malvaceae - Sida Sp. Urenalobota. 4. Myrtaceae - Eucalyptus, Callistemon 5. Umbelliferae - Coriandrum /Anethum / Foeniculum. 6. Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax. 7. Solanaceae - Solanum nigrum/Withania, Nicotina, Plumbaginefolia. 8. Lamiaceae - Salvia/Ocimum. 9. Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha. 10. Fasaceae - TephrosiaSp.,Crotalaria Sp., 11. Caesalpineaeceae - Cassia Sp., 12. Asclepiadaeceae- PesgulariaGygnema, 13. Apocynaceae - Hollorhen, Catharanthus. 14. Rubiaceae - Oldenladeae, Spermoeoceae, 15. Liliaceae - Asphodelus/Lilium/Allium.	lectures)	Maity	
university. Kumar Maity 3		16. Poaceae - Triticum/Hordeum/Avena.			
wild plant with herbarium label (to be submitted in the record Kumar	2	, , , ,		Kumar	
	3	wild plant with herbarium label (to be submitted in the record		Kumar	

Semes	ster IV (AY 2022-2025)	Period:	to		
Paper: SEC2T (Mushroom CultureTechnology) (Theory) Full		Full Marks: 40	Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology : Infrastructure: su Polythene bag, vessels, Inoculation hook, inocula			Dr.Nilay Kumar	

	sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra
4	Unit 4: Food Preparation:Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra

Curriculum Plan (Botany Honours: CBCS)

Curriculum Plan (Botany Honours; CBCS)					
Seme	ster V (AY 2022-2025)	Period:	to		
_	: CC11T (Reproductive Biology of osperms) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS	L	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction :History (contributions of G.B. Amici, W. Hofmeister, E. Strasburger, S.G. Nawaschin, P. Maheshwari, B.M. Johri, W.A. Jensen, J. Heslop-Harrison) and scope.			Susanta Kumar Maity	
2		uctive development :Induction of flowering; flower as a ninate shoot. Flower development: genetic and molecular			
3	Unit 3: Anther and pollen biology Anther wall: Structure and functions, microsporogenesis, callose deposition and its significance. Microgametogenesis; Pollen wall structure, MGU (male germ unit) structure, NPC system; Palynology and scope (a brief account); Pollen wall proteins; Pollen viability, storage and germination; Abnormal features: Pseudomonads, polyads, massulae, pollinia.			Susanta Kumar Maity	
4	Unit 4: Ovule Structure; Types; Special structures—endothelium, and hypostase; Female Gametophyte — megasporo bisporic and tetrasporic) and megagametogenesis (Polygonumtype); Organization and ultrastructure of	obturator, aril, caruncle genesis (monosporic, details of		Susanta Kumar Maity	
5	Unit 5: Pollination and fertilization Pollination types and significance; adaptations; str path of pollen tube in pistil; double fertilization.			Susanta Kumar Maity	
6	Unit 6: Self incompatibility Basic concepts (interspecific, intraspecific, homon GSI and SSI); Methods to overcome self- incompa bud pollination, stub pollination; Intra-ovarian and Modification of stigma surface, parasexual hybridi fertilization.	tibility: mixed pollination, in vitro pollination;		Susanta Kumar Maity	
7	Unit 7: Embryo, Endosperm and Seed Structure and types; General pattern of developme embryo and endosperm; Suspensor: structure and fendosperm relationship; Nutrition of embryo; Unu development in <i>Paeonia</i> . Seed structure, important mechanisms	functions; Embryo- sual features; Embryo		Susanta Kumar Maity	

8	Units 7: Polyembryony and apomixis	Susan	ta
	Introduction; Classification; Causes and applications.	Kuma	r
		Maity	

Semes	ster V (AY 2022-2025)	Period:	to		
Paper: CC11P (Reproductive Biology of Angiosperms) (Practical) Full Marks: 20 Credit		redit:02			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Anther: Wall and its ontogeny; Ta glandular); MMC, spore tetrads, uninucleat anther stages through slides/micrographs, through photographs and schematic represent	e, bicelled and dehisced male germ unit (MGU)	(40 lectures)	Susanta Kumar Maity	
2	2. Pollen grains: Fresh and acetolyzed shown aperture, psuedomonads, polyads, pollinia (material), ultrastructure of pollen wall(micro Tetrazolium test.germination: Calculation of in different media using hanging drop method	wing ornamentation and (slides/photographs, fresh ograph); Pollen viability: percentage germination		Susanta Kumar Maity	
3	3. Ovule: Types-anatropou amphitropous/campylotropous, circinotropou Tenuinucellate and crassinucellate; Special obturator, hypostase, caruncle and slides/specimens/photographs).	us, unitegmic, bitegmic; structures: Endothelium,		Susanta Kumar Maity	
4	4. Female gametophyte through permanent sl Types, ultrastructure of mature egg apparatus			Susanta Kumar Maity	
5	5. Intra-ovarian pollination; Test tube photographs.	e pollination through		Susanta Kumar Maity	
6	6. Endosperm: Dissections of developing se free-nuclear haustoria.	eeds for endosperm with		Susanta Kumar Maity	
7	7. Embryogenesis: Study of development of permanent slides; dissection of developing various developmental stages; Study of sus micrographs	g seeds for embryos at		Susanta Kumar Maity	

Semes	ster V (AY 2022-2025)	Period:	to		
Paper:	CC12T (Plant Physiology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	101100		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant-water relations Water Potential and its components, water absorption by roots,		(60	Dr.Nilay Kumar	

2	aquaporins, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sap – cohesion-tension theory. Transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement. Unit 2: Mineral nutrition Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.	lectures)	Maitra Dr.Nilay Kumar Maitra
3	Unit 3: Nutrient Uptake Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport.		Dr.Nilay Kumar Maitra
4	Unit 4: Translocation in the phloem Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.		Dr.Nilay Kumar Maitra
5	Unit 5: Plant growth regulators Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid.		Dr.Nilay Kumar Maitra
6	Unit 6: Physiology of flowering Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.		Dr.Nilay Kumar Maitra
7	Unit 7: Phytochrome, crytochromes and phototropins Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.		Dr.Nilay Kumar Maitra

Semes	ter V (AY 2022-2025)	Period:	to		
Paper:	CC12P (Plant Physiology) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determination of osmotic potential of plant comethod.	ell sap by plasmolytic	(40 lectures)	Dr.Nilay Kumar Maitra	
2	Determination of water potential of given weight method.	tissue (potato tuber) by		Dr.Nilay Kumar Maitra	
3	Study of the effect of wind velocity and transpiration in excised twig/leaf.	d light on the rate of		Dr.Nilay Kumar Maitra	
4	Calculation of stomatal index and stomatal surfaces of leaves of a mesophyte and xeroph			Dr.Nilay Kumar Maitra	
5	To calculate the area of an open stoma and open through stomata in a mesophyte and xer			Dr.Nilay Kumar Maitra	
6	To study the phenomenon of seed germination	n (effect of light).		Dr.Nilay Kumar Maitra	
7	To study the effect of different conce <i>Avena</i> coleoptile elongation (IAA Bioassay).	entrations of IAA on		Dr.Nilay Kumar Maitra	

8	To study the induction of amylase activity in germinating barley grains.	Dr.Nilay Kumar Maitra
	Demonstration experiments	
	1. To demonstrate suction due to transpiration.	Dr.Nilay Kumar Maitra
	2. Fruit ripening/Rooting from cuttings (Demonstration).	Dr.Nilay Kumar Maitra
	3. Bolting experiment/Avenacoleptile bioassay (demonstration).	Dr.Nilay Kumar Maitra

Semes	ster V (AY 2022-2025)	Period:	to		
Paper:	DSE1 (Biostatistics) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biostatistics Definition - statistical methods - basic - measurements, functions, limitations a		(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Collection of data primary and Types and methods of data collection and demerits. Classification - tabulation data - sampling methods.	procedures - merits		Dr.Nilay Kumar Maitra	
3	Unit 3:Measures of central tendency Mean, median, mode, geometric mean Measures of dispersion - range, stand deviation, quartile deviation - merits efficient of variations.	lard deviation, mean		Dr.Nilay Kumar Maitra	
4	Unit 4: Correlation Types and methods of correlation, regression equation, fitting prediction dissimilarities of correlation and regression.	on, similarities and		Dr.Nilay Kumar Maitra	
5	Unit 5: Statistical inference Hypothesis - simple hypothesis - studer test.			Dr.Nilay Kumar Maitra	

Semes	ster V (AY 2022-2025)	Period:	to		
Paper:	r: DSE 1P (Biostatistics) (Practical) Full Marks: 20 Credit		redit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Calculation of mean, standard deviation and standard error		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Calculation of correlation coefficient values and finding out the probability			Dr.Nilay Kumar	

		Maitra
3	Calculation of 'F' value and finding out the probability value for the F value.	Dr.Nilay Kumar Maitra

Semes	ter V (AY 2022-2025)	Period:	to		
Paper:	DSE2 (Plant Breeding) (Theory)	Full Marks: 40	Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant Breeding Introduction and objectives. Breeding reproduction in crop plants. Importar undesirable consequences of plant breed	nt achievements and	(8 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Methods of crop improvement Introduction: Centres of origin and deplants, plant genetic resources; Acclin methods: For self pollinated, crovegetatively propagated plants; Hybrocoss and vegetatively propagated advantages and limitations.	omestication of crop matization; Selection oss pollinated and ridization: For self,	(8 lectures)	Susanta Kumar Maity	
3	Unit 3: Quantitative inheritance Concept, mechanism, examples of incolour in wheat, Skin colour in human polygenic Inheritance.		(8 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Inbreeding depression and he History, genetic basis of inbreeding heterosis; Applications.		(8 lectures)	Susanta Kumar Maity	
5	Unit 5: Crop improvement and breed Role of mutations; Polyploidy; Distant I role of biotechnology in crop improvem	hybridization and	(8 lectures)	SkMd Ismail Al Amin	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Period: to		(Botany Honours; CBCS)					
Sl. No. TOPICS CLASSIS ALLOTED taken by	Seme	ster VI (AY 2022-2025)	Period:	to			
1 Unit 1: Concept of metabolism Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric ,covalent modulation and Isozymes). Unit 2: Carbon assimilation Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction. Unit 3: Carbohydrate metabolism Synthesis and catabolism of sucrose and starch. Unit 4: Carbon Oxidation Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration. Unit 5: ATP-Synthesis Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers. Unit 6: Lipid metabolism Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation Unit 7: Nitrogen metabolism Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination. Unit 8: Mechanisms of signal transduction Receptor-ligand interactions; Second messenger concept, Calcium calmodulin,	Paper	: CC13T (Plant Metabolism) (Theory)	Full Marks:	Cred	it:		
catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosterie ,covalent modulation and Isozymes). Unit 2: Carbon assimilation Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q eyele, CO2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction. Unit 3: Carbohydrate metabolism Synthesis and catabolism of sucrose and starch. Unit 4: Carbon Oxidation Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration. Unit 5: ATP-Synthesis Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers. Unit 6: Lipid metabolism Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation Unit 7: Nitrogen metabolism Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination. Unit 8: Mechanisms of signal transduction Receptor-ligand interactions; Second messenger concept, Calcium calmodulin,	Sl. No.	TOPICS				Remark	
interactions; Second messenger concept, Calcium calmodulin,	Sl. No.	Unit 1: Concept of metabolism Introduct catabolic pathways, regulation of metabor regulatory enzymes (allosteric ,covalent resolution). Unit 2: Carbon assimilation Historical bar photosynthetic pigments, role of photosy (chlorophylls and accessory pigments), a reaction centres, photochemical reactions electron transport, PSI, PSII, Q cycle, CO photorespiration, C4 pathways; Crassulate Factors affecting CO2 reduction. Unit 3: Carbohydrate metabolism Synthesucrose and starch. Unit 4: Carbon Oxidation Glycolysis, fat regulation of glycolysis, oxidative pentos oxidative decarboxylation of pyruvate, re NADH shuttle; TCA cycle, amphibolic rereactions, regulation of the cycle, mitoch transport, oxidative phosphorylation, cya respiration, factors affecting respiration. Unit 5: ATP-Synthesis Mechanism of Allevel phosphorylation, chemiosmotic meand photophosphorylation, chemiosmotic meand photophosphorylation, chemiosmotic meand photophosphorylation, at Racker's experiment; role of uncouplers. Unit 6: Lipid metabolism Synthesis and latriglycerides, β-oxidation, glyoxylate cycle and its role in mobilisation of lipids durin oxidation Unit 7: Nitrogen metabolism Nitrate assinitrogen fixation (examples of legumes a Physiology and biochemistry of nitrogen	ion, anabolic and olism, role of modulation and ockground, anthetic pigments and as, photosynthetic D2 reduction, cean acid metabolism; esis and catabolism of e of pyruvate, se phosphate pathway, egulation of PDH, ole, anaplerotic ondrial electron mide-resistant TP synthesis, substrate chanism (oxidative ee, Boyers ent, Jagendorf's oreakdown of ele, gluconeogenesis ag seed germination, α milation, biological and non-legumes);	CLASSES ALLOTED	Class taken by Dr.Nilay Kumar	Remark	
		interactions; Second messenger concept,					

Seme	ster VI (AY 2022-2025)	Period:	to		
Paper	:: CC13P Plant Metabolism (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	 Chemical separation of photosynthetice Experimental demonstration of Hill's To study the effect of light intensity of photosynthesis. Effect of carbon dioxide on the rate of To compare the rate of respiration in organization. To demonstrate activity of Nitrate recleaves of different plant sources. To study the activity of lipases in ger demonstrate mobilization of lipids 1. due Demonstration of fluorescence by iso pigments. Demonstration of absorption spectrum pigments 	s reaction. In the rate of If photosynthesis. Idifferent parts of a Iductase in germinating Iminating oilseeds and ring germination. Idiated chlorophyll	(35 lectures)	Dr.Nilay Kumar Maitra	

Semes	ster VI (AY 2022-2025)	Period:	to		
Paper	: CC14T (Plant Biotechnology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit -1: Plant Tissue Culture Historical perspective; Composition of media; Nutrient and hormone requirements (role of vitamins and hormones); Totipotency; Organogenesis; Embryogenesis (somatic and zygotic); Protoplast isolation, culture and fusion; Tissue culture applications (micropropagation, androgenesis, virus elimination, secondary metabolite production, haploids, triploids and hybrids; Cryopreservation; Germplasm Conservation).		(30 lectures)	Susanta Kumar Maity	
	Unit- 2: Recombinant DNA technology Restriction Endonucleases (History, Types I-IV, biological role and application); Unit - 5: Applications of Biotechnology Pest resistant (Bt-cotton); herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved				

quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Gentically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.			
2 Unit- 2: Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC). Unit- 3:Gene Cloning Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCRmediated gene cloning; Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR Unit- 4: Methods of gene transfer Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics—selectable marker and reporter genes (Luciferase, GUS, GFP).	(30 lectures)	SkMd Ismail Al Amin	

Semester V (AY 2022-2025)		Period:	to			
Paper:	: CC14P (CC14P () (Practical) Full Marks:		Credit:		
Sl. No.		TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	(a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs.		(16 lectures)	Susanta Kumar Maity		
	3. Isolation of	protoplasts.				
2	4. Construction the data provide	n of restriction map of circuled.	lar and linear DNA from	(16 lectures)	SkMd Ismail Al Amin	
	5. Study of methods of gene transfer through photographs: Agrobacterium-mediated, direct gene					
	6. transfer by electroporation, microinjection, microprojectile bombardment.					
		ps of genetic engineering follows: lavr Savr tomato through ph	_			
	8. Isolation of	plasmid DNA.				
	9. Restriction digestion and gel electrophoresis of plasmid DNA.					

Semester VI (AY 2022-2025)	Period:	to	
Paper: DSE3 (Industrial and Environmental	Full Marks:	Credit:	

Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Scope of microbes in industry and environment Unit 2: Bioreactors/Fermenters and fermentation processes Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactorslaboratory, pilotscale and production fermenters; Constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and air-lift fermenter. A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations. Unit 3: Microbial production of industrial products Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme:	(50 lectures)	SkMd Ismail Al Amin	
	amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin) Unit 4: Microbial enzymes of industrial interest and enzyme immobilization Microorganisms for industrial applications_and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).		Maity	
	Unit 5: Microbes and quality of environment. Distribution of microbes in air; Isolation of microorganisms from soil, air and water. Unit 6: Microbial flora of water. Water pollution, role of microbes in sewage			
	and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples.			
	Unit 7: Microbes in agriculture and remediation of contaminated soils. Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.			

Semes	ster VI (AY 2022-2025)	Period:	to		
Paper: DSE3 (Industrial and Environmental Microbiology) (Practical)		Full Marks:	Cred	it:	
Sl. No.	SI. No. TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Principles and functioning of instruments in microbiology laboratory		(30 lectures)	SkMd Ismail Al Amin	
	2. Hands on sterilization techniques and preparation of culture media.			& Susanta Kumar Maity	

Semes	ster VI (AY 2022-2025)	Period: to			
Paper: DSE4 (Analytical Techniques in Plant Sciences) (Theory)		Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Imaging and related techniques Principles of microscopy; Light microscopy; Fluorescence microscopy; Confocal microscopy; Use of fluorochromes: (a) Flow cytometry (FACS); (b) Applications of fluorescence microscopy: Chromosome banding, FISH, chromosome painting; Transmission and Scanning electron microscopy – sample preparation for electron microscopy, cryofixation, negative staining, shadow casting, freeze fracture, freeze etching.			SkMd Ismail Al Amin & Susanta Kumar Maity	
	Unit- 2: Cell fractionation Centrifugation: Differential and density gradient centrifugation, sucrose density gradient, CsCl2gradient, analytical centrifugation, ultracentrifugation, marker enzymes.				
	Unit- 3: Radioisotopes Use in biological research, autoradiography, pulse chase experiment.				
	Unit- 4: Spectrophotometry Principle and its application in biological research.				
	Unit- 5: Chromatography Principle; Pape Column chromatography, TLC, GLC, HI chromatography; Molecular sieve chromatography.	PLC, Ionexchange			
	Unit- 6: Characterization of proteins and spectrometry; X-ray diffraction; X-ray or Characterization of proteins and nucleic a AGE, PAGE, SDS-PAGE	ystallography;			
	Unit- 7: Biostatistics Statistics, data, popular parameters; Representation of Data: Tabu Measures of central tendency: Arithmetic Measures of dispersion: Range, mean devistandard deviation; Chi-square test for go	ular, Graphical; e mean, mode, median; viation, variation,			

Semes	ster VI (AY 2022-2025)	Period:	to		
-	DSE4 (Analytical Techniques in Plant ces) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Study of Blotting techniques: Southern, Northern and Western, DNA		(30	SkMd Ismail Al	

fingerprinting, DNA sequencing, PCR through photographs.	lectures)	Amin
2. Demonstration of ELISA.		
3. To separate nitrogenous bases by paper chromatography.		&
4. To separate sugars by thin layer chromatography.		Susanta
5. Isolation of chloroplasts by differential centrifugation.		Susanta Kumar Maity
6. To separate chloroplast pigments by column chromatography.		
7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE.		
9. To separation DNA (marker) using AGE.		
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).11. Preparation of permanent slides (double staining)		

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

Semes	ster I (AY 2021-2024)	Period:	to		
Paper:	CC 1T(Phycology and Microbiology) (Theory)	Full Marks: 40+15	C	Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to microbial world: Microbial nutrition, growth and metabolism. Economic importance of viruses with reference to vaccine production, role in research, medicine and diagnostics, as causal organisms of plant diseases. Economic importance of bacteria with reference to their role in agriculture and industry (fermentation and medicine).		(7 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Viruses Discovery, physiochemical and biological characteristics; classification (Baltimore), general structure with special reference to viroids and prions; replication (general account), DNA virus (T-phage), lytic and lysogenic cycle; RNA virus (TMV).		(7 lectures	SkMd Ismail Al Amin	
3	Unit 3: Bacteria Discovery, general archaebacteria, eubacteria, wall-less for spheroplasts); Cell structure; Nutritional vegetative, asexual and recombination (con and transduction).	ms (mycoplasma and types; Reproduction-	(7 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Algae General characteristics; Ec range of thallus organization; Cell structur wall, pigment system, reserve food (of only g syllabus), flagella; methods of reproductions system of Fritsch, and evolutionary classific groups) and Van – den Hoek et.al(1982); Sig important phycologists (F.E. Fritsch, G.M. S Desikachary, H.D. Kumar, M.O.P. Iyengar environment, agriculture, biotechnology and	e and components; cell groups represented in the g Classification; criteria, ation of Lee (only upto mificant contributions of Smith, R.N. Singh, T.V.). Role of algae in the	(11 lectures)	Susanta Kumar Maity	
5	Unit 5: Cyanophyta and Xanthophyta Ec Range of thallus organization; Cell st Morphology and life-cycle of Nostoc and Van	ructure; Reproduction,	(8 lectures)	Susanta Kumar Maity	
6	Unit 6: Chlorophyta and Charophyta Occurrence; Range of thallus organiz Reproduction. Morphology and life-cycle Volvox, Oedogonium, Coleochaete, Chara. E of Prochloron.	ation; Cell structure; es of <i>Chlamydomonas</i> ,	(8 lectures)	Susanta Kumar Maity	
7	Unit 7: Phaeophyta and Rhodophyta: Char Range of thallus organization; Cell st Morphology and life-cycles of <i>Ectocarpus</i> , F	ructure; Reproduction.	(12 lectures)	Susanta Kumar Maity	

Semes	ter I (AY 2021-2024)	Period:	to		
Paper: CC 1P (Phycology and Microbiology) Full Marks: 20 Credit:02 (Practical)			edit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark

1	Microbiology 1. Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle. 2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule. 3. Gram staining. 4. Endospore staining with malachite green using the (endospores taken from soil bacteria). 5. Study of bacteria from root nodules/Curd sample.	20	SkMd Ismail Al Amin
2	Phycology Study of vegetative and reproductive structures of Nostoc, <i>Chlamydomonas</i> (electron micrographs), Volvox, <i>Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus</i> and <i>Polysiphonia, Procholoron</i> through electron micrographs, temporary preparations and permanent slides.	20	Susanta Kumar Maity

Semes	ster I (AY 2021-2024)	Period:	to		
	: CC 2T (Biomolecules and Cell gy) (Theory)	Full Marks: 40+15		Credit:04	
Sl. No.	TOPICS	I.	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biomolecules: Types and significal Structure and properties of water; pH and I Carbohydrates: Nomenclature and classific Monosaccharides; Disaccharides; Oligosa polysaccharides. Lipids: Definition and mand structural lipids; Fatty acids structure a Essential fatty acids; Triacylglycerols structure properties; Phosphoglycerides. Proteins: Structure-primary, and quarternary; Protein denaturation and proteins. Nucleic acids: Structure of nitrog and function of nucleotides; Types of nuclein A, B, Z types of DNA; Types of RNA; Structure of RNA; Structure of DNA; Types of RNA; Structure of DNA; Ty	cution; ccharides and ujor classes of storage and functions; cture, functions and tructure of amino secondary, tertiary biological roles of enous bases; Structure eic acids; Structure of	(20 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Bioenergenetics: Laws of thermod free energy, endergonic and exergonic reac reactions, redox reactions. ATP: structure, currency molecule.	ctions, coupled	(4 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Enzymes: Structure of enzyme: hole cofactors, coenzymes and prosthetic group enzymes; Features of active site, substrate mechanism of action (activation energy, lo induced - fit theroy), Michaelis – Menten einhibition and factors affecting enzyme act	; Classification of specificity, ck and key hypothesis, equation, enzyme	(6 lectures)	Dr. Nilay Kumar Maitra	
4	Unit4: The cell: Cell as a unit of structure a	and function:	(4	Dr. Nilay	

	Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).	lectures)	Kumar Maitra
5	Unit 5: Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.	(4 lectures)	Dr. NilayKumar Maitra
6	Unit 6: Cell organelles: Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export ofproteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes	(16 lectures)	Dr. Nilay Kumar Maitra
7	Unit 7: Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.	(6 lectures)	Dr. Nilay Kumar Maitra

Semes	ster I (AY 2021-2024)	Period:	to		
-	: CC 2P (: Biomolecules and Cell gy) (Practical)	Full Marks: 20	С	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Qualitative tests for carbohydrates, recucing sugars, lipids and proteins.	educing sugars, non-	(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Study of plant cell structure with the mount of Onion/Rhoeo /Crinum.	help of epidermal peel		Dr. Nilay Kumar Maitra	
3	3. Demonstration of the phenomenon of streaming in Hydrilla leaf.	f protoplasmic		Dr. Nilay Kumar Maitra	
4	4. Measurement of cell size by the techn	nique of micrometry.		Dr. Nilay Kumar Maitra	
5	5. Counting the cells per unit volume w haemocytometer. (Yeast/pollen grains).	•		Dr. Nilay Kumar Maitra	
6	6. Study of cell and its organelles with t micrographs.	he help of electron		Dr. Nilay Kumar Maitra	

7	7. Cytochemical staining of : DNA- Feulgen Actocarmin and AcetoOrcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	Dr. Nilay Kumar Maitra
8	8. Study the phenomenon of plasmolysis and deplasmolysis.	Dr. NilayKumar Maitra
9	9. Study the effect of organic solvent and temperature on membrane permeability.	Dr. Nilay Kumar Maitra
10	10. Study different stages of mitosis and meiosis.	Dr. Nilay Kumar Maitra

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	ster II (AY 2021-2024)	Period:	to		
-	CC 3T (Mycology and pathology) (Theory)	Full Marks: 40	(Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to true fungi: General of Affinities with plants and animals; Thallus wall composition; Nutrition; Classification.	organization; Cell	(6 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Chytridiomycota and Zygomycota: features; Ecology and significance; Thallus Reproduction; Life cycle with reference to Rhizopus.	organisation;	(5 lecture)	Dr. Nilay Kumar Maitra	
3	Unit 3: Ascomycota: General characteristic fruiting bodies); Ecology; Life cycle, Heter parasexuality; Life cycle and classification Saccharomyces, Aspergillus, Penicillium, A Neurospora and Peziza.	okaryosis and with reference to	(10 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Basidiomycota: General characteris cycle and Classification with reference to b wheat Puccinia (Physiological Specialization smut (symptoms only), Agaricus; Biolumin and Mushroom Cultivation with special reference of Mashroom.	lack stem rust on on), loose and covered sescence, Fairy Rings	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Allied Fungi: General characteristic molds, Classification; Occurrence; Types o fruiting bodies.		(3 lectures)	Dr. Nilay Kumar Maitra	
6	Unit 6: Oomycota: General characteristics; and classification with reference to Phytoph		(4 lectures)	Dr. Nilay Kumar Maitra	
7	Unit 7: Symbiotic associations Lichen: – Ocharacteristics; Growth forms and range of Nature of associations of algal and fungal p Reproduction; Mycorrhiza-Ectomycorrhiza	thallus organization; partners;	(4 lectures)	Dr. Nilay Kumar Maitra	

	and their significance.		
8	Unit 8: Applied Mycology: Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.	(10 Lectures)	Dr. Nilay Kumar Maitra
9	Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine.	(10 lectures)	Dr. Nilay Kumar Maitra
10	Bacterial diseases: – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.	(10 lectures)	SkMdIsmail Al Amin

Seme	ster II (AY 2021-2024)	Period:	to		
-	: CC 3P(Mycology and pathology)(Practical)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Introduction to the world of fungi (Unicella coenocytic/septate mycelium, ascocarps&base)		(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Rhizopus: study of asexual stage from tempsexual structures through permanent slides.	porary mounts and		Dr. Nilay Kumar Maitra	
3	3. Aspergillus and Penicillium: study of asexu temporary mounts. Study of Sexual stage from slides/photographs.	-	Dr. Nilay Kumar Maitra		
4	4. Peziza: Ascobulus sectioning through asco	carp.		Dr. Nilay Kumar Maitra	
5	5. Alternaria: Specimens/photographs and ten	nporary mounts.		Dr. Nilay Kumar Maitra	
6	6. Puccinia: Herbarium specimens of Black S and infected Barberry leaves; sections/ mount and permanent slides of both the hosts.			Dr. Nilay Kumar Maitra	
7	7. Agaricus: Specimens of button stage and fu sectioning of gills of Agaricus, fairy rings and mushrooms to be shown.	-		Dr. Nilay Kumar Maitra	
8	8. Study of phaneroplasmodium from actual s photograph. Study of Stemonitis sporangia.	pecimens and /or		Dr. Nilay Kumar Maitra	

9	9. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.		Dr. Nilay Kumar Maitra	
10	10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)		Dr. Nilay Kumar Maitra	
11	11. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.	(10 lectures)	SkMd Ismail Al Amin	

Semes	ster II (AY 2021-2024)	Period:	to		
Paper	: CC 4T (Archegoniate) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction: Unifying features of Transition to land habit; Alternation of ge	_	(4 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Bryophytes: General characteristi land habit; Classification; Range of thallu		(6 lectures)	SkMd Ismail Al Amin	
3	Unit 3: Type Studies:- Bryophytes Classifamily), morphology, anatomy and reproduction and explanatia, Pellia, Porella, Anthoceros, Sunaria; Pogonatum, Reproduction and explication, Marchantia, Plagichasma Anthoce (developmental stages not included). Eco importance of bryophytes with special results.	duction of Riccia, Sphagnum and volutionary trends in eros and Funaria logical and economic	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Pteridophytes: General characteric Early land plants (Cooksonia and Rhynia	·	(6 lectures)	Susanta Kumar Maity	
5	Unit 5: Type Studies-: Pteridophytes Class family), morphology, anatomy and reproduced Selaginella, Equisetum and Pteris (Develoto be included). Apogamy, and apospory, habit, telome theory, stelar evolution; Economic importance.	duction of Psilotum, opmental details not heterosporyandseed	(14 lectures)	Susanta Kumar Maity	
6	Unit 6: Gymnosperms: General character (up to family), morphology, anatomy and Cycas, Pinus and Gnetum (Developmenta included); Ecological and economic important	reproduction of al details not to be	(18 lectures)	Susanta Kumar Maity	

Semes	ster II (AY 2021-2024)	Period:	to		
Paper:	CC 4P (Archegoniate) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Riccia – Morphology of thallus.		(15 lectures)		
2	2. Marchantia- Morphology of thallus, whole mour vertical section of thallus through Gemma cup, who temporary slides), vertical section of Antheridioph- longitudinal section of Sporophyte (all permanents	ole mount of Gemmae (all ore, Archegoniophore,	rectures)	SkMd Ismail Al Amin	
3	3. Anthoceros- Morphology of thallus, dissection of stomata, spores, pseudoelaters, columella) (tempor of thallus (permanent slide).			SkMd Ismail Al Amin	
4	4. Pellia, Porella- Permanent slides.			SkMd Ismail Al Amin	
5	5. Sphagnum- Morphology of plant, whole mounts only).	of leaf (permanent slide		SkMd Ismail Al Amin	
6	6. Funaria- Pogonatum/ Polytrichum Morphology, rhizoids, operculum, peristome, annulus, spores (te permanent slides showing antheridial and archegor section of capsule and protonema.	emporary slides);		SkMd Ismail Al Amin	
7	7. Psilotum- Study of specimen, transverse section slide).	of synangium (permanent	(15 lectures)	Susanta Kumar Maity	
8	8. Selaginella- Morphology, whole mount of leaf w section of stem, whole mount of strobilus, whole m and megasporophyll (temporary slides), longitudin (permanent slide).	nount of microsporophyll		Susanta Kumar Maity	
9	9. Equisetum- Morphology, transverse section of in section of strobilus, transverse section of strobilus, sporangiophore, whole mount of spores (wet and d transverse section of rhizome (permanent slide).	whole mount of		Susanta Kumar Maity	
10	10. Pteris- Morphology, transverse section of rachi sporophyll, wholemount of sporangium, whole mos lides), transverse section of rhizome, whole moun organs and young sporophyte (permanent slide).	ount of spores (temporary		Susanta Kumar Maity	
11	11. Cycas- Morphology (coralloid roots, bulbil, lea microsporophyll, transverse section of coralloid ror rachis, vertical section of leaflet, vertical section of mount of spores (temporary slides), longitudinal se section of root (permanent slide).	ot, transverse section of f microsporophyll, whole		Susanta Kumar Maity	
12	12. Pinus- Morphology (long and dwarf shoots, who male and female cones), transverse section of Needstem, longitudinal section of / transverse section of of microsporophyll, whole mount of Microspores (longitudinal section of female cone, tangential long longitudinal sections stem (permanent slide).	dle, transverse section of f male cone, whole mount (temporary slides),		Susanta Kumar Maity	
13	13. Gnetum- Morphology (stem, male & female co stem, vertical section of ovule (permanent slide)	ones), transverse section of		Susanta Kumar Maity	

14	14. Botanical excursion	Susanta	
		Kumar	
		Maity	

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

	(Botan	ny Honours; CBCS)			
Ser	mester III (AY 2021-2024)	Period: to			
	per: CC5T (Anatomy of Angiosperms)	Full Marks: 40	Credit:04		
Sl. N o.	TOPICS		CLASSE S ALLOTE D	Class taken by	Rema rk
1	Unit 1: Introduction and scope of Plant Ana systematics, forensics and pharmacognosy.		(4 Lectures)	Susanta Kumar Maity	
2	Unit 2: Structure and Development of Plant plant body: The three tissue systems, types of plant body: polarity, cytodifferentiation a embryogenic development, Root-stem transconcept.	of cells and tissues. Development and organogenesis during	(6 Lectures)	Susanta Kumar Maity	
3	Unit 3: Tissues Classification of tissues; Sin phylogeny); cytodifferentiation of tracheary Pits and plasmodesmata; Wall ingrowths ar incrustation, Ergastic substances. Hydathod laticifers.	y elements and sieve elements; and transfer cells, adcrustation and	(12Lectur es)	Susanta Kumar Maity	
4	Unit 4: Apical meristems: Evolution of con apex (Apical cell theory, Histogen theory, Terristematic residue, cytohistological zona Structure of dicot and monocot stem. Origin diversity in size and shape of leaves; Struct Kranz anatomy. Organization of root apex (theory, Korper-Kappe theory); Quiescent codicot and monocot root; Endodermis, exode	Tunica Corpus theory, continuing tion); Types of vascular bundles; n, development, arrangement and ure of dicot and monocot leaf, (Apical cell theory, Histogen entre; Root cap; Structure of	(15 Lectures)	Susanta Kumar Maity	
5	Unit 5: Vascular Cambium and Wood Structure activity of cambium; Secondary growth in secondary growth in Bignonia, Boerhaavia, Axially and radially oriented elements; Typ Cyclic aspects and reaction wood; Sapwood diffuse porous wood; Early and late wood, Development and composition of periderm.	root and stem. Anomalous Aristolochia and Dracaena. ses of rays and axial parenchyma; d and heartwood; Ring and tyloses; Dendrochronology.	(15 Lectures)	Susanta Kumar Maity	
6	Unit 6: Adaptive and Protective Systems Epepicuticular waxes, trichomes(uni-and mult nonglandular, two examples of each), stomand incrustation; Anatomical adaptations of Mechanical tissue – distribution and significant	cicellular, glandular and ata (classification); Adcrustation f xerophytes and hydrophytes.	(8 Lectures)	SusantaKu mar Maity	

Semes	ster III (AY 2021-2024)	Period:	to		
Paper: CC5P (Anatomy of Angiosperms) (Practical)		Full Marks: 20		Credit:02	
Sl. No.	TOPICS		CLASSE S ALLOTE D	Class taken by	Remark
1	Study of anatomical details through permanent s mounts/ macerations/museum specimens with the l examples. Apical meristem of root, shoot and vascular came.	help of suitable	(20 Lectur es)	Susanta Kumar Maity	
	 Distribution and types of parenchyma, collenchy Xylem: Tracheary elements-tracheids, vessel eleperforation plates; xylem fibres. Wood: ring porous; diffuse porous; tyloses; hear Phloem: Sieve tubes-sieve plates; companion ce Epidermal system: cell types, stomata types; tricand glandular Root: monocot, dicot, secondary growth. Stem: monocot, dicot - primary and secondary glenticels. Leaf: isobilateral, dorsiventral, C4 leaves (Kranti. Adaptive Anatomy: xerophytes, hydrophytes. Secretory tissues: cavities, lithocysts and laticing 	ements; thickenings; t- and sapwood. lls; phloem fibres. chomes: non-glandular rowth; periderm;			

No. A 1 Unit 1: Origin of Cultivated Plants: Concept of Centres of Origin, their (6)	Credit:02 CLASSES ALLOTED (60 lectures)	Class taken by Dr. Nilay Kumar Maitra	Remark
1 Unit 1: Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. Unit 2: Cereals: Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets. Unit 3: Legumes: Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and ecosystem. Unit 4: Sources of sugars and starches: (Morphology cultivation, management and processing of sugarcane, products and by-products of sugarcane industry. Potato – morphology, propagation & uses. Unit 5: Spices: Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper	ALLOTED (60	Dr. Nilay Kumar	Remark
importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. Unit 2: Cereals: Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets. Unit 3: Legumes: Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and ecosystem. Unit 4: Sources of sugars and starches: (Morphology cultivation, management and processing of sugarcane, products and by-products of sugarcane industry. Potato — morphology, propagation & uses. Unit 5: Spices: Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper		Nilay Kumar	
Unit 7: Sources of oils and fats :General description, classification, extraction, their uses and health implications groundnut, coconut, linseed, soybean, mustard and coconut (Botanical name, family & uses). Essential Oils: General account, extraction methods, comparison with fatty oils & their uses. Unit 8: Natural Rubber: Para-rubber: tapping, processing and uses. Unit 9: Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis; Tobacco (Morphology, processing, uses and health hazards). Unit 10: Timber plants: General account with special reference to teak and pine.			

Semes	ter III (AY 2021-2024)	Period:	to		
Paper:	CC6P (Economic Botany) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS	TOPICS		Class taken by	Remark
No.	1. Cereals: Wheat (habit sketch, L. S/T.S. g chemical tests) Rice (habit sketch, study of micro-chemical tests). 2. Legumes: Soybean, Groundnut, (habit, fr chemical tests). 3. Sources of sugars and starches: Sugarcan micro-chemical tests), Potato (habit sketch, show localization of starch grains, w.m. startests). 4. Spices: Black pepper, Fennel and Clove (5. Beverages: Tea (plant specimen, tea leav beans). 6. Sources of oils and fats: Coconut-T.S. m seeds; tests for fats in crushed seeds. 7. Essential oil-yielding plants: Habit sketch and Eucalyptus (specimens/photographs). 8. Rubber: specimen, photograph/model of products. 9. Drug-yielding plants: Specimens of Digit 10. Tobacco: specimen and products of Tob 11. Woods: Tectona, Pinus: Specimen, Sect	paddy and grain, starch grains, uit, seed structure, microe (habit sketch; cane juicetuber morphology, T.S. tuber treh grains, micro-chemical habit and sections). es), Coffee (plant specimen, at, Mustard–plant specimen, and Gantalum tapping, samples of rubber alis, Papaver and Cannabis.	ALLOTED (24 lectures)	Dr. Nilay Kumar Maitra	
	12. Fiber-yielding plants: Cotton (specimen lint and fuzz; whole mount of fiber and test transverse section of stem, test for lignin on fiber).	for cellulose), Jute (specimen,			

Semes	ster III (AY 2021-2024)	Period:		to		
Paper	Paper: CC7T (Genetics) (Theory) Full Marks: 40		40	Cr	edit:04	
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance.		(16 lectures)	SkMd Ismail Al Amin		
2	Unit 2: Extrachromosomal Inheritance Chloroplas Four o'clock plant; Mitochondrial mutations in ye- coiling in snail; Infective heredity- Kappa particles	ast; Maternal effec		(6 lectures)	SkMd Ismail Al Amin	

3	Unit 3: Linkage, crossing over and chromosome mapping Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.	(12 lectures)	SkMd Ismail Al Amin
4	Unit 4: Variation in chromosome number and structure Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy	(8 lectures)	SkMd Ismail Al Amin
5	Unit 5: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation.DNA repair mechanisms.	(6 lectures)	SkMd Ismail Al Amin
6	Unit 6: Fine structure of gene Classical vs molecular concepts of gene; Cis- Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.	(6 lectures)	SkMd Ismail Al Amin
7	Unit 6. Population and Evolutionary Genetics Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	(6 lectures)	SkMd Ismail Al Amin

Semes	ster III (AY 2021-2024)	Period:	to		
Paper:	Paper: CC7P (Genetics) (Practical) Full Marks: 20		Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Demonstration on pretreatment, fixation squash and smear preparation.	on, staining and	(40 lectures)	SkMd Ismail Al Amin	
2	2. Study of Mitosis from Onion / Garlic /	Lentil root.		SkMd Ismail Al Amin	
3	3. Study of Meiosis with pollen mother c Solanum / Datura by smear preparation.	ell (PMC) of Onion /		SkMd Ismail Al Amin	
4	4. Mendel's laws through seed ratios. Lal probability and chi-square.	poratory exercises in		SkMd Ismail Al Amin	
5	5. Chromosome mapping using point test	cross data.		SkMd Ismail Al Amin	
6	6. Pedigree analysis for dominant and rec sex linked traits	essive autosomal and		SkMd Ismail Al Amin	
7	7. Incomplete dominance and gene interaratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4			SkMd Ismail Al Amin	
8	8. Blood Typing: groups & Rh factor.			SkMd Ismail Al Amin	

9	9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	SkMd Ismail Al Amin
10	10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.	SkMd Ismail Al Amin
11	11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe	SkMd Ismail Al Amin

Semester III (AY 2021-2024) Period:		to			
Paper: SEC1T (Biofertilizers) (Theory) Full		Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.		(4 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Azospirillum: isolation and mass multiplication, consideration and mass multiplication. Unit 2: Azospirillum: isolation and mass multiplication and mass multiplication associative effect of different microorganisms. Azotobacter: classification, consideration and mass multiplication.	t characteristics – crop	(8 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.		(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Mycorrhizal association, types of myctaxonomy, occurrence and distribution, phospand yield – colonization of VAM – isolation a production of VAM, and its influence on grouplants.	shorus nutrition, growth and inoculum	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Organic farming – Green manuring ar Recycling of biodegradable municipal, agricu wastes – biocompost making methods, types a vermicomposting – field Application.	ltural and Industrial	(6 lectures)	Dr. Nilay Kumar Maitra	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Bottiny Honours, CBCs)							
Semes	ster IV (AY 2021-2024)	Period:	to				
Paper:	CC8T (Molecular Biology) (Theory)	Credi	t:				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark		
1	Unit- 1: Nucleic acids: Carriers of genetic information Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey		(60	SkMd Ismail			

	& Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.	lectures)	Al Amin	
2	Unit -2. The Structures of DNA and RNA / Genetic Material DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA-Prokaryotes, Viruses, Eukaryotes.RNA Structure-Organelle DNA mitochondria and chloroplast DNA.TheNucleosomeChromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.			
3	Unit- 2:The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.			
4	Unit- 3: Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)			
5	Unit 4: Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes:transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.	(60 lectures)	Susanta Kumar Maity	
6	Unit 5: Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.			
7	Unit 6: Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNAsynthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.			

Semester IV (AY 2021-2024) Period:		to			
Paper: CC8P (Molecular Biology) (Practical) Full Marks:		Full Marks:	Credit:		
Sl. No.	TOPICS	1	CLASSES ALLOTED	Class taken by	Remark
1	Preparation of LB medium and raising E.Coli. Solution of genomic DNA from <i>E.Coli</i> .		(30 lectures)	SkMd Ismail Al Amin	
	3. DNA isolation from cauliflower head.		&		
	DNA estimation by diphenylamine reagent/UV Study of DNA replication mechanisms through circle, Theta replication and semi-discontinuous replication.	photographs (Rolling	T I	Susanta Kumar Maity	
	6. Study of structures of prokaryotic RNA polymorpolymerase II through photographs	erase and eukaryotic RNA			
	7. Photographs establishing nucleic acid as geneti Stahl's, Avery et al, Griffith's, Hershey & Chase' experiments)				
	8. Study of the following through photographs: A	ssembly of Spliceosome	1		

machinery; Splicing mechanism in group I & group II introns; Ribozyme and		
Alternative splicing.		

Semes	ster IV (AY 2021-2024)	Period:	to		
-	CC9T (Plant Ecology and geography) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction Basic concepts; Leve Inter-relationships between the living wo environment, the components and dynam	rld and the	(60 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Soil Importance; Origin; Formatic Physical; Chemical and Biological compo Role of climate in soil development.	•		Dr. Nilay Kumar Maitra	
3	Unit 3: Water Importance: States of water Atmospheric moisture; Precipitation type hail, dew); Hydrological Cycle; Water in	s (rain, fog, snow,		Dr. Nilay Kumar Maitra	
4	Unit 4: Light, temperature, wind and fire adaptations of plants to their variation.	Variations;		Dr. Nilay Kumar Maitra	
5	Unit 5: Ecosystems Structure; Processes; organisation; Food chains and Food webs pyramids.	-		Dr. Nilay Kumar Maitra	
6	Unit 6: Population ecology Characteristic .Ecological Speciation	es and Dynamics		Dr. Nilay Kumar Maitra	
7	Unit 7: Plant communities Concept of ecc Habitat and niche; Characters: analytical Ecotone and edge effect; Dynamics: succ types; climax concepts.	and synthetic;		Dr. Nilay Kumar Maitra	
8	Unit 8: Biotic interactions Trophic organion of energy, autotrophy, heterotrophy; symmony commensalism, parasitism; food chains a pyramids; biomass, standing crop.	biosis,		Dr. Nilay Kumar Maitra	
9	Unit 9: Functional aspects of ecosystem I of energy flow; Production and productive efficiencies; Biogeochemical cycles; Cyc	rity; Ecological		Dr. Nilay Kumar Maitra	

Nitrogen and Phosph	orus.		
of tolerance; Endem biomes (one each fro	mphy Principles; Continental drift; Theory sm; Brief description of major terrestrial m tropical, temperate & tundra); ivision of India; Local Vegetation.	Dr. Nilay Kumar Maitra	

Semes	ster IV (AY 2021-2024)	Period:	to		
-	: CC9P (Plant Ecology and geography) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measur variables: Soil thermometer, maximum thermometer, anemometer, psychrome gauge and lux meter.	n and minimum	(36 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH of various soil meter, universal indicator/Lovibond co			Dr. Nilay Kumar Maitra	
3	3. Analysis for carbonates, chlorides, r organic matter and base deficiency fro			Dr. Nilay Kumar Maitra	
4	4. two soil samples by rapid field tests			Dr. Nilay Kumar Maitra	
5	5. Determination of organic matter of Walkley& Black rapid titration	different soil samples by		Dr. Nilay Kumar Maitra	
6	6. method			Dr. Nilay Kumar Maitra	
7	7. Comparison of bulk density, porosit of water in soils of three habitats.	ty and rate of infiltration		Dr. Nilay Kumar Maitra	
8	8. Determination of dissolved oxygen polluted and unpolluted sources.	of water samples from		Dr. Nilay Kumar Maitra	
9	9. (a). Study of morphological adaptate xerophytes (four each). (b). Study of b following: Stem parasite (Cuscuta), Ro Epiphytes, Predation (Insectivorous pl	oot parasite (Orobanche)		Dr. Nilay Kumar Maitra	
10	10. Determination of minimal quadrat herbaceous vegetation in the college care curve method (species to be listed).	= = = = = = = = = = = = = = = = = = =		Dr. Nilay Kumar Maitra	
11	11. Quantitative analysis of herbaceou college campus for frequency and com Raunkiaer's frequency distribution law	nparison with		Dr. Nilay Kumar Maitra	

12	12. Quantitative analysis of herbaceous vegetation for density	Dr. Nilay
	and abundance in the college campus. 13. Field visit to familiarise students with ecology of different sites.	Kumar Maitra

Seme	ster IV (AY 2021-2024)	Period:	to		
Paper	: CC10T (Plant Systematics) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Significance of Plant systematics Int Plant identification, Classification, Nomencl palynology, cytology, phytochemistry and minventory; Functions of Herbarium; Importa gardens of the world and India; Virtual herb Documentation: Flora, Monographs, Journal and Multi-access.	ature. Evidences from nolecular data. Field nt herbaria and botanical arium; E-flora;	(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Taxonomic hierarchy Concept of tax species); Categories and taxonomic hierarch (taxonomic, biological, evolutionary).	,		Susanta Kumar Maity	
3	Unit 3: Botanical nomenclature Principles at and names; Typification, author citation, val of names, principle of priority and its limitat	id publication, rejection		Susanta Kumar Maity	
4	Unit 4: Systems of classification Major cont Theophrastus, Bauhin, Tournefort, Linnaeus Bessey, Hutchinson, Takhtajan and Cronqui systems of Bentham and Hooker (upto series (upto series); Brief reference of Angiosperm (APG III) classification.	, Adanson, de Candolle, st; Classification s) and Engler and Prantl		Susanta Kumar Maity	
5	Unit 5: Biometrics, numerical taxonomy and Variations; OTUs, character weighting and of Phenograms, cladograms (definitions and di	coding; Cluster analysis;		Susanta Kumar Maity	
6	Unit 6: Phylogeny of Angiosperms Terms and advanced, homology and analogy, paral monophyly, Paraphyly, polyphyly and clade of angiosperms; Co-evolution of angiosperm of illustrating evolutionary relationship (phy cladogram).	lelism and convergence, s). Origin and evolution as and animals; Methods		Susanta Kumar Maity	

Semes	ster IV (AY 2021-2024)	Period:	to		
Paper:	CC10P (Plant Systematics) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of vegetative and floral characte	rs of the following	(36	Susanta Kumar	

2 2. Field visit (local) – Subject to grant of funds from the university. 3 3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book). Susanta Kumar Maity Susanta Kumar Maity		families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): 1. Ranunculaceae - Ranunculus, Delphinium. 2. Brassicaceae - Brassica, Alyssum / Iberis. 3. Malvaceae - Sida Sp. Urenalobota. 4. Myrtaceae - Eucalyptus, Callistemon 5. Umbelliferae - Coriandrum /Anethum / Foeniculum. 6. Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax. 7. Solanaceae - Solanum nigrum/Withania, Nicotina, Plumbaginefolia. 8. Lamiaceae - Salvia/Ocimum. 9. Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha. 10. Fasaceae - TephrosiaSp.,Crotalaria Sp., 11. Caesalpineaeceae - Cassia Sp., 12. Asclepiadaeceae- PesgulariaGygnema, 13. Apocynaceae - Hollorhen, Catharanthus. 14. Rubiaceae - Oldenladeae, Spermoeoceae, 15. Liliaceae - Asphodelus/Lilium/Allium.	lectures)	Maity	
university. Kumar Maity 3		16. Poaceae - Triticum/Hordeum/Avena.			
wild plant with herbarium label (to be submitted in the record Kumar	2	, , , ,		Kumar	
	3	wild plant with herbarium label (to be submitted in the record		Kumar	

Semes	ster IV (AY 2021-2024)	Period:	to		
•	SEC2T (Mushroom reTechnology) (Theory)	Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology : Infrastructure: si Polythene bag, vessels, Inoculation hook, inocula			Dr.Nilay Kumar	

	sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	Maitra
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra
4	Unit 4: Food Preparation:Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra

Curriculum Plan (Botany Honours: CBCS)

		Botany Honours; CBC	S)		
Seme	ster V (AY 2021-2024)	Period:	to		
_	: CC11T (Reproductive Biology of osperms) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction : History (contributions of C E. Strasburger, S.G. Nawaschin, P. Maheshwari, I Heslop-Harrison) and scope.		(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Reproductive development :Induction o modified determinate shoot. Flower development aspects.			Susanta Kumar Maity	
3	Unit 3: Anther and pollen biology Anther wall: Structure and functions, microsporog and its significance. Microgametogenesis; Pollen germ unit) structure, NPC system; Palynology and Pollen wall proteins; Pollen viability, storage and features: Pseudomonads, polyads, massulae, polli	wall structure, MGU (male d scope (a brief account); germination; Abnormal		Susanta Kumar Maity	
4	Unit 4: Ovule Structure; Types; Special structures—endothelium, and hypostase; Female Gametophyte — megasporo bisporic and tetrasporic) and megagametogenesis Polygonumtype); Organization and ultrastructure of	genesis (monosporic, (details of		Susanta Kumar Maity	
5	Unit 5: Pollination and fertilization Pollination types and significance; adaptations; str path of pollen tube in pistil; double fertilization.			Susanta Kumar Maity	
6	Unit 6: Self incompatibility Basic concepts (interspecific, intraspecific, homor GSI and SSI); Methods to overcome self- incompa bud pollination, stub pollination; Intra-ovarian and Modification of stigma surface, parasexual hybrid fertilization.	atibility: mixed pollination, lin vitro pollination;		Susanta Kumar Maity	
7	Unit 7: Embryo, Endosperm and Seed Structure and types; General pattern of developme embryo and endosperm; Suspensor: structure and endosperm relationship; Nutrition of embryo; Unu development in <i>Paeonia</i> . Seed structure, importan mechanisms	functions; Embryo- sual features; Embryo		Susanta Kumar Maity	

8	Units 7: Polyembryony and apomixis	Susanta	
	Introduction; Classification; Causes and applications.	Kumar	
		Maity	

Semes	ster V (AY 2021-2024)	Period: to			
-	CC11P (Reproductive Biology of osperms) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Anther: Wall and its ontogeny; Ta glandular); MMC, spore tetrads, uninucleat anther stages through slides/micrographs, through photographs and schematic represent	e, bicelled and dehisced male germ unit (MGU)	(40 lectures)	Susanta Kumar Maity	
2	2. Pollen grains: Fresh and acetolyzed shown aperture, psuedomonads, polyads, pollinia (material), ultrastructure of pollen wall(micro Tetrazolium test.germination: Calculation of in different media using hanging drop method	wing ornamentation and (slides/photographs,fresh ograph); Pollen viability: f percentage germination		Susanta Kumar Maity	
3	3. Ovule: Types-anatropou amphitropous/campylotropous, circinotropou Tenuinucellate and crassinucellate; Special obturator, hypostase, caruncle and slides/specimens/photographs).	us, unitegmic, bitegmic; structures: Endothelium,		Susanta Kumar Maity	
4	4. Female gametophyte through permanent sl Types, ultrastructure of mature egg apparatus			Susanta Kumar Maity	
5	5. Intra-ovarian pollination; Test tube photographs.	e pollination through		Susanta Kumar Maity	
6	6. Endosperm: Dissections of developing se free-nuclear haustoria.	eeds for endosperm with		Susanta Kumar Maity	
7	7. Embryogenesis: Study of development of permanent slides; dissection of developing various developmental stages; Study of sus micrographs	g seeds for embryos at		Susanta Kumar Maity	

Semes	ster V (AY 2021-2024)	Period:	to		
Paper:	CC12T (Plant Physiology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant-water relations Water Potential and its components, water absorption by roots,		(60	Dr.Nilay Kumar	

2	aquaporins, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sap – cohesion-tension theory. Transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement. Unit 2: Mineral nutrition Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.	lectures)	Maitra Dr.Nilay Kumar Maitra
3	Unit 3: Nutrient Uptake Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport.		Dr.Nilay Kumar Maitra
4	Unit 4: Translocation in the phloem Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.		Dr.Nilay Kumar Maitra
5	Unit 5: Plant growth regulators Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid.		Dr.Nilay Kumar Maitra
6	Unit 6: Physiology of flowering Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.		Dr.Nilay Kumar Maitra
7	Unit 7: Phytochrome, crytochromes and phototropins Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.		Dr.Nilay Kumar Maitra

Semes	ster V (AY 2021-2024)	Period:	to		
Paper:	CC12P (Plant Physiology) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determination of osmotic potential of plant c method.	ell sap by plasmolytic	(40 lectures)	Dr.Nilay Kumar Maitra	
2	Determination of water potential of given weight method.	tissue (potato tuber) by		Dr.Nilay Kumar Maitra	
3	Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf.			Dr.Nilay Kumar Maitra	
4	Calculation of stomatal index and stomatal surfaces of leaves of a mesophyte and xeroph			Dr.Nilay Kumar Maitra	
5	To calculate the area of an open stoma and open through stomata in a mesophyte and xer			Dr.Nilay Kumar Maitra	
6	To study the phenomenon of seed germination	n (effect of light).		Dr.Nilay Kumar Maitra	
7	To study the effect of different conceavenacoleoptile elongation (IAA Bioassay).	entrations of IAA on		Dr.Nilay Kumar Maitra	

8	To study the induction of amylase activity in germinating barley grains.	Dr.Nilay Kumar Maitra
	Demonstration experiments	
	1. To demonstrate suction due to transpiration.	Dr.Nilay Kumar Maitra
	2. Fruit ripening/Rooting from cuttings (Demonstration).	Dr.Nilay Kumar Maitra
	3. Bolting experiment/Avenacoleptile bioassay (demonstration).	Dr.Nilay Kumar Maitra

Semes	ster V (AY 2021-2024)	Period:	to		
Paper:	DSE1 (Biostatistics) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biostatistics Definition - statistical methods - basic - measurements, functions, limitations a		(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Collection of data primary and secondary Types and methods of data collection procedures - merits and demerits. Classification - tabulation and presentation of data - sampling methods.			Dr.Nilay Kumar Maitra	
3	Unit 3:Measures of central tendency Mean, median, mode, geometric mean Measures of dispersion - range, stand deviation, quartile deviation - merits efficient of variations.	lard deviation, mean		Dr.Nilay Kumar Maitra	
4	Unit 4: Correlation Types and methods of correlation, regression equation, fitting prediction dissimilarities of correlation and regression.	on, similarities and		Dr.Nilay Kumar Maitra	
5	Unit 5: Statistical inference Hypothesis - simple hypothesis - studer test.			Dr.Nilay Kumar Maitra	

Semes	ster V (AY 2021-2024)	Period:	to		
Paper:	Paper: DSE 1P (Biostatistics) (Practical) Full Marks: 20		Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Calculation of mean, standard deviation and standard error		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Calculation of correlation coefficient values and finding out the probability			Dr.Nilay Kumar	

		Maitra	
3	Calculation of 'F' value and finding out the probability value for the F value.	Dr.Nilay Kumar Maitra	

Semes	ter V (AY 2021-2024)	Period:	to		
Paper: DSE2 (Plant Breeding) (Theory) Full Marks: 40		Credit:04			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant Breeding Introduction and objectives. Breeding reproduction in crop plants. Important undesirable consequences of plant breeding	nt achievements and	(8 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Methods of crop improvement Introduction: Centres of origin and deplants, plant genetic resources; Acclin methods: For self pollinated, crovegetatively propagated plants; Hybrocoss and vegetatively propagated advantages and limitations.	omestication of crop matization; Selection oss pollinated and ridization: For self,	(8 lectures)	Susanta Kumar Maity	
3	Unit 3: Quantitative inheritance Concept, mechanism, examples of in colour in wheat, Skin colour in human polygenic Inheritance.		(8 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Inbreeding depression and he History, genetic basis of inbreeding heterosis; Applications.		(8 lectures)	Susanta Kumar Maity	
5	Unit 5: Crop improvement and breed Role of mutations; Polyploidy; Distant I role of biotechnology in crop improvem	hybridization and	(8 lectures)	SkMd Ismail Al Amin	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Botany Honours; CBCS)						
Seme	ster VI (AY 2021-2024)	Period:	to			
Paper	: CC13T (Plant Metabolism) (Theory)	Full Marks:	Cred	it:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark	
_	•	ion, anabolic and lism, role of modulation and ckground, anthetic pigments and so photosynthetic of reduction, rean acid metabolism; sis and catabolism of e of pyruvate, re phosphate pathway, regulation of PDH, role, anaplerotic condrial electron anide-resistant. The synthesis, substrate chanism (oxidative e, Boyers ent, Jagendorf's preakdown of le, gluconeogenesis	CLASSES	Class	Remark	
	Unit 7: Nitrogen metabolism Nitrate assin nitrogen fixation (examples of legumes a Physiology and biochemistry of nitrogen assimilation and transamination.	nd non-legumes);				
	Unit 8: Mechanisms of signal transduction Receptor-ligand interactions; Second messenger concept, Calcium calmodulin, MAP kinase cascade					

Semester VI (AY 2021-2024) Period: Paper: CC13P Plant Metabolism (Practical) Full Marks:		Period:	to		
		Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	 Chemical separation of photosyntheti Experimental demonstration of Hill's To study the effect of light intensity of photosynthesis. Effect of carbon dioxide on the rate of the rate o	s reaction. on the rate of f photosynthesis. different parts of a ductase in germinating rminating oilseeds and ring germination. olated chlorophyll	(35 lectures)	Dr.Nilay Kumar Maitra	

Semes	ster VI (AY 2021-2024)	Period:	to		
Paper:	CC14T (Plant Biotechnology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit -1: Plant Tissue Culture Historical perspective Nutrient and hormone requirements (role of vitamic Totipotency; Organogenesis; Embryogenesis (som Protoplast isolation, culture and fusion; Tissue culture (micropropagation, androgenesis, virus elimination production, haploids, triploids and hybrids; Cryope Conservation). Unit- 2: Recombinant DNA technology Restriction Types I-IV, biological role and application); Unit - 5: Applications of Biotechnology Pest resist resistant plants (RoundUp Ready soybean); Transquality traits (Flavr Savr tomato, Golden rice); Importations (Moondust carnations); Role of transgeni (Superbug); edible vaccines; Industrial enzymes (Alipase); Gentically Engineered Products—Human Glumulin; Biosafety concerns.	ns and hormones); atic and zygotic); aure applications a, secondary metabolite reservation; Germplasm In Endonucleases (History, ant (Bt-cotton); herbicide genic crops with improved broved horticultural cs in bioremediation Aspergillase, Protease,	(30 lectures)	Susanta Kumar Maity	
2	Unit- 2: Restriction Mapping (Linear and Circular) Prokaryotic (pUC 18 and pUC19, pBR322, Ti plas	-	(30 lectures)	SkMd Ismail Al	

phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC).	Amin	
Unit- 3:Gene Cloning Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCRmediated gene cloning; Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR		
Unit- 4: Methods of gene transfer Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics—selectable marker and reporter genes (Luciferase, GUS, GFP).		

Semester V (AY 2021-2024)		Period:	to			
Paper: CC14P () (Practical)		Full Marks:	Cred	Credit:		
Sl. No.		TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	sterilization and tobacco, Datura 2. Study of anti	a, Brassica etc. ner, embryo and endosperm ogenesis & artificial seeds t	g leaf and nodal explants of a culture, micropropagation,	(16 lectures)	Susanta Kumar Maity	
2	the data provid 5. Study of met Agrobacterium 6. transfer by 6 bombardment. 7. Study of step Golden rice, Fl 8. Isolation of	of restriction map of circuled. chods of gene transfer throu- mediated, direct gene electroporation, microinject os of genetic engineering for avr Savr tomato through phenomenate descriptions of the plasmid DNA. igestion and gel electropho	gh photographs: ion, microprojectile or production of Bt cotton, notographs.	(16 lectures)	SkMd Ismail Al Amin	

Semes	ster VI (AY 2021-2024)	Period:	to		
-	DSE3 (Industrial and Environmental biology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Scope of microbes in industry and environment		(50 lectures)	SkMd Ismail Al Amin	
	Unit 2: Bioreactors/Fermenters and fermentation processes Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous			Aiiiii	

fermentations. Components of a typical bioreactor, Types of bioreactorslaboratory, pilotscale and production fermenters; Constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and air-lift fermenter. A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations.	&	
Unit 3: Microbial production of industrial products Microorganisms involved, media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme: amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin)	Susanta Kumar Maity	
Unit 4: Microbial enzymes of industrial interest and enzyme immobilization Microorganisms for industrial applications_and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).		
Unit 5: Microbes and quality of environment. Distribution of microbes in air; Isolation of microorganisms from soil, air and water. Unit 6: Microbial flora of water. Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples.		
Unit 7: Microbes in agriculture and remediation of contaminated soils. Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.		

Semes	ster VI (AY 2021-2024)	Period:	to		
Paper: DSE3 (Industrial and Environmental Microbiology) (Practical)		Full Marks:	Cred		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Principles and functioning of instrumtaboratory	nents in microbiology	(30 lectures)	SkMd Ismail Al Amin	
	2. Hands on sterilization techniques and preparation of culture media.			& Susanta Kumar Maity	

Semes	ter VI (AY 2021-2024)	Period:	to		
Paper: DSE4 (Analytical Techniques in Plant Sciences) (Theory)		Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark

1	Unit- 1: Imaging and related techniques Principles of	(50 lectures)	SkMd Ismail Al	
	microscopy; Light microscopy; Fluorescence microscopy;	lectures)	Amin	
	Confocal microscopy; Use of fluorochromes: (a) Flow			
	cytometry (FACS); (b) Applications of fluorescence		&	
	microscopy: Chromosome banding, FISH, chromosome		Susanta	
	painting; Transmission and Scanning electron microscopy –		Kumar	
	sample preparation for electron microscopy, cryofixation,		Maity	
	negative staining, shadow casting, freeze fracture, freeze			
	etching.			
	cteming.			
	Unit- 2: Cell fractionation Centrifugation: Differential and			
	density gradient centrifugation, sucrose density gradient,			
	CsCl2gradient, analytical centrifugation, ultracentrifugation,			
	marker enzymes.			
	Unit- 3: Radioisotopes Use in biological research, auto-			
	radiography, pulse chase experiment.			
	Unit- 4: Spectrophotometry Principle and its application in			
	biological research.			
	III (5 Cl) I D' I D I (I			
	Unit- 5: Chromatography Principle; Paper chromatography;			
	Column chromatography, TLC, GLC, HPLC, Ionexchange			
	chromatography; Molecular sieve chromatography; Affinity			
	chromatography.			
	Unit- 6: Characterization of proteins and nucleic acids Mass			
	•			
	spectrometry; X-ray diffraction; X-ray crystallography;			
	Characterization of proteins and nucleic acids; Electrophoresis:			
	AGE, PAGE, SDS-PAGE			
	Unit- 7: Biostatistics Statistics, data, population, samples,			
	parameters; Representation of Data: Tabular, Graphical;			
	Measures of central tendency: Arithmetic mean, mode, median;			
	· · · · · · · · · · · · · · · · · · ·			
	Measures of dispersion: Range, mean deviation, variation,			
	standard deviation; Chi-square test for goodness of fit.			
		l		

Semes	ster VI (AY 2021-2024)	Period:	to		
Paper: DSE4 (Analytical Techniques in Plant Sciences) (Practical)		Full Marks:	Cred	it:	
Sl. No.			CLASSES ALLOTED	Class taken by	Remark
1	Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs. 2. Demonstration of ELISA.		(30 lectures)	SkMd Ismail Al Amin	
	3. To separate nitrogenous bases by paper chromatography.4. To separate sugars by thin layer chromatography.			&	
	5. Isolation of chloroplasts by differential centrifugation.			Susanta Kumar Maity	

6. To separate chloroplast pigments by column chromatography.		
7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE.		
9. To separation DNA (marker) using AGE.		
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).		
11. Preparation of permanent slides (double staining)		

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

Semes	ster I (AY 2020-2023)	Period:	to		
Paper:	CC 1T(Phycology and Microbiology) (Theory)	Full Marks: 40+15	C	Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1			(7 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Viruses Discovery, physioche characteristics; classification (Baltimore), special reference to viroids and prions; replic DNA virus (T-phage), lytic and lysogenic cycles.	general structure with cation (general account), cle; RNA virus (TMV).	(7 lectures	SkMd Ismail Al Amin	
3	Unit 3: Bacteria Discovery, general archaebacteria, eubacteria, wall-less for spheroplasts); Cell structure; Nutritional vegetative, asexual and recombination (con and transduction).	ns (mycoplasma and types; Reproduction-	(7 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Algae General characteristics; Ecrange of thallus organization; Cell structure wall, pigment system, reserve food (of only gayllabus), flagella; methods of reproduction; system of Fritsch, and evolutionary classific groups) and Van – den Hoek et.al(1982); Sig important phycologists (F.E. Fritsch, G.M. S. Desikachary, H.D. Kumar, M.O.P. Iyengar environment, agriculture, biotechnology and structure of the pigment of	e and components; cell groups represented in the g Classification; criteria, ation of Lee (only upto nificant contributions of Smith, R.N. Singh, T.V.). Role of algae in the	(11 lectures)	Susanta Kumar Maity	
5	Unit 5: Cyanophyta and Xanthophyta Ec Range of thallus organization; Cell st Morphology and life-cycle of Nostoc and Van	ructure; Reproduction, ucheria.	(8 lectures)	Susanta Kumar Maity	
6	Unit 6: Chlorophyta and Charophyta Occurrence; Range of thallus organiz Reproduction. Morphology and life-cycle Volvox, Oedogonium, Coleochaete, Chara. E of Prochloron.	ation; Cell structure; s of <i>Chlamydomonas</i> , volutionary significance	(8 lectures)	Susanta Kumar Maity	
7	Unit 7: Phaeophyta and Rhodophyta: Char Range of thallus organization; Cell st Morphology and life-cycles of <i>Ectocarpus</i> , F	ructure; Reproduction.	(12 lectures)	Susanta Kumar Maity	

Semes	ster I (AY 2020-2023)	Period:		to		
Paper: CC 1P (Phycology and Microbiology) Full Marks: 20 (Practical)		20	Credit:02			
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark

1	Microbiology 1. Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle. 2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule. 3. Gram staining. 4. Endospore staining with malachite green using the (endospores taken from soil bacteria). 5. Study of bacteria from root nodules/Curd sample.	20	SkMd Ismail Al Amin
2	Phycology Study of vegetative and reproductive structures of Nostoc, <i>Chlamydomonas</i> (electron micrographs), Volvox, <i>Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus</i> and <i>Polysiphonia, Procholoron</i> through electron micrographs, temporary preparations and permanent slides.	20	Susanta Kumar Maity

Seme	ster I (AY 2020-2023)	Period:	to		
-	e: CC 2T (Biomolecules and Cell gy) (Theory)	Full Marks: 40+15		Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biomolecules: Types and signiff Structure and properties of water; pH ar Carbohydrates: Nomenclature and class Monosaccharides; Disaccharides; Oligo polysaccharides. Lipids: Definition and and structural lipids; Fatty acids structu Essential fatty acids; Triacylglycerols st properties; Phosphoglycerides. Proteins acids; Levels of protein structure-prima and quarternary; Protein denaturation at proteins. Nucleic acids: Structure of nitt and function of nucleotides; Types of RNA;	and buffers. diffication; dosaccharides and major classes of storage re and functions; tructure, functions and difficulty: dif	(20 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Bioenergenetics: Laws of them free energy, endergonic and exergonic reactions, redox reactions. ATP: structu currency molecule.	reactions, coupled	(4 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Enzymes: Structure of enzyme: cofactors, coenzymes and prosthetic greenzymes; Features of active site, substramechanism of action (activation energy induced - fit theroy), Michaelis – Mente inhibition and factors affecting enzyme	oup; Classification of ate specificity, , lock and key hypothesis, en equation, enzyme	(6 lectures)	Dr. Nilay Kumar Maitra	
4	Unit4: The cell: Cell as a unit of structu	re and function:	(4	Dr. Nilay	

	Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).	lectures)	Kumar Maitra
5	Unit 5: Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.	(4 lectures)	Dr. NilayKumar Maitra
6	Unit 6: Cell organelles: Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export ofproteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes	(16 lectures)	Dr. Nilay Kumar Maitra
7	Unit 7: Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.	(6 lectures)	Dr. Nilay Kumar Maitra

Semes	ster I (AY 2020-2023)	Period:	to		
-	: CC 2P (: Biomolecules and Cell gy) (Practical)	Full Marks: 20	С	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Qualitative tests for carbohydrates, recreducing sugars, lipids and proteins.	ducing sugars, non-	(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Study of plant cell structure with the hount of Onion/Rhoeo /Crinum.	nelp of epidermal peel		Dr. Nilay Kumar Maitra	
3	3. Demonstration of the phenomenon of streaming in Hydrilla leaf.	protoplasmic		Dr. Nilay Kumar Maitra	
4	4. Measurement of cell size by the techn	ique of micrometry.		Dr. Nilay Kumar Maitra	
5	5. Counting the cells per unit volume wi haemocytometer. (Yeast/pollen grains).	th the help of		Dr. Nilay Kumar Maitra	
6	6. Study of cell and its organelles with the micrographs.	ne help of electron		Dr. Nilay Kumar Maitra	

7	7. Cytochemical staining of : DNA- Feulgen Actocarmin and AcetoOrcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	Dr. Nilay Kumar Maitra
8	8. Study the phenomenon of plasmolysis and deplasmolysis.	Dr. NilayKumar Maitra
9	9. Study the effect of organic solvent and temperature on membrane permeability.	Dr. Nilay Kumar Maitra
10	10. Study different stages of mitosis and meiosis.	Dr. Nilay Kumar Maitra

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	ter II (AY 2020-2023)	Period:	to		
-	CC 3T (Mycology and pathology) (Theory)	Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to true fungi: General of Affinities with plants and animals; Thallus wall composition; Nutrition; Classification.	organization; Cell	(6 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Chytridiomycota and Zygomycota: features; Ecology and significance; Thallus Reproduction; Life cycle with reference to Rhizopus.	organisation;	(5 lecture)	Dr. Nilay Kumar Maitra	
3	Unit 3: Ascomycota: General characteristic fruiting bodies); Ecology; Life cycle, Heter parasexuality; Life cycle and classification Saccharomyces, Aspergillus, Penicillium, A Neurospora and Peziza.	okaryosis and with reference to	(10 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Basidiomycota: General characteris cycle and Classification with reference to b wheat Puccinia (Physiological Specialization smut (symptoms only), Agaricus; Biolumin and Mushroom Cultivation with special reference.	lack stem rust on on), loose and covered sescence, Fairy Rings	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Allied Fungi: General characteristic molds, Classification; Occurrence; Types of fruiting bodies.		(3 lectures)	Dr. Nilay Kumar Maitra	
6	Unit 6: Oomycota: General characteristics; and classification with reference to Phytoph		(4 lectures)	Dr. Nilay Kumar Maitra	
7	Unit 7: Symbiotic associations Lichen: – O characteristics; Growth forms and range of Nature of associations of algal and fungal p Reproduction; Mycorrhiza-Ectomycorrhiza	thallus organization; partners;	(4 lectures)	Dr. Nilay Kumar Maitra	

	and their significance.		
8	Unit 8: Applied Mycology: Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.	(10 Lectures)	Dr. Nilay Kumar Maitra
9	Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine.	(10 lectures)	Dr. Nilay Kumar Maitra
10	Bacterial diseases: – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.	(10 lectures)	SkMdIsmail Al Amin

Semes	ster II (AY 2020-2023)	Period:	to		
-	: CC 3P(Mycology and pathology)(Practical)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Introduction to the world of fungi (Unicellu coenocytic/septate mycelium, ascocarps&basical)		(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Rhizopus: study of asexual stage from temp sexual structures through permanent slides.	porary mounts and		Dr. Nilay Kumar Maitra	
3	3. Aspergillus and Penicillium: study of asexu temporary mounts. Study of Sexual stage from slides/photographs.	-		Dr. Nilay Kumar Maitra	
4	4. Peziza: Ascobulus sectioning through ascoo	carp.		Dr. Nilay Kumar Maitra	
5	5. Alternaria: Specimens/photographs and ten	nporary mounts.		Dr. Nilay Kumar Maitra	
6	6. Puccinia: Herbarium specimens of Black S and infected Barberry leaves; sections/ mount and permanent slides of both the hosts.			Dr. Nilay Kumar Maitra	
7	7. Agaricus: Specimens of button stage and fu sectioning of gills of Agaricus, fairy rings and mushrooms to be shown.			Dr. Nilay Kumar Maitra	
8	8. Study of phaneroplasmodium from actual s photograph. Study of Stemonitis sporangia.	pecimens and /or	-	Dr. Nilay Kumar Maitra	

9	9. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.		Dr. Nilay Kumar Maitra	
10	10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)		Dr. Nilay Kumar Maitra	
11	11. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.	(10 lectures)	SkMd Ismail Al Amin	

Semes	ster II (AY 2020-2023)	Period:	to		
Paper	CC 4T (Archegoniate) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction: Unifying features of Transition to land habit; Alternation of ge		(4 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Bryophytes: General characteristic land habit; Classification; Range of thallu		(6 lectures)	SkMd Ismail Al Amin	
3	Unit 3: Type Studies:- Bryophytes Classifamily), morphology, anatomy and reproduction Anthoceros, S. Funaria; Pogonatum, Reproduction and ev. Riccia, Marchantia, Plagichasma Anthoce (developmental stages not included). Eco importance of bryophytes with special reference.	duction of Riccia, Sphagnum and volutionary trends in ros and Funaria logical and economic	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Pteridophytes: General characteris Early land plants (Cooksonia and Rhynia)		(6 lectures)	Susanta Kumar Maity	
5	Unit 5: Type Studies-: Pteridophytes Class family), morphology, anatomy and reproduced Selaginella, Equisetum and Pteris (Development to be included). Apogamy, and apospory, habit, telome theory, stelar evolution; Economic importance.	duction of Psilotum, opmental details not heterosporyandseed	(14 lectures)	Susanta Kumar Maity	
6	Unit 6: Gymnosperms: General character (up to family), morphology, anatomy and Cycas, Pinus and Gnetum (Developmenta included); Ecological and economic important	reproduction of al details not to be	(18 lectures)	Susanta Kumar Maity	

Semes	ster II (AY 2020-2023)	Period:	to		
Paper:	CC 4P (Archegoniate) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Riccia – Morphology of thallus.		(15 lectures)		
2	Marchantia- Morphology of thallus, whole more vertical section of thallus through Gemma cup, where temporary slides), vertical section of Antheridiop longitudinal section of Sporophyte (all permanents).	nole mount of Gemmae (all hore, Archegoniophore,	rectures)	SkMd Ismail Al Amin	
3	3. Anthoceros- Morphology of thallus, dissection stomata, spores, pseudoelaters, columella) (tempo of thallus (permanent slide).			SkMd Ismail Al Amin	
4	4. Pellia, Porella- Permanent slides.			SkMd Ismail Al Amin	
5	5. Sphagnum- Morphology of plant, whole mount only).	ts of leaf (permanent slide		SkMd Ismail Al Amin	
6	6. Funaria- Pogonatum/ Polytrichum Morphology rhizoids, operculum, peristome, annulus, spores (permanent slides showing antheridial and archego section of capsule and protonema.	temporary slides);		SkMd Ismail Al Amin	
7	7. Psilotum- Study of specimen, transverse section slide).	n of synangium (permanent	(15 lectures)	Susanta Kumar Maity	
8	8. Selaginella- Morphology, whole mount of leaf section of stem, whole mount of strobilus, whole and megasporophyll (temporary slides), longitudi (permanent slide).	mount of microsporophyll		Susanta Kumar Maity	
9	9. Equisetum- Morphology, transverse section of section of strobilus, transverse section of strobilus sporangiophore, whole mount of spores (wet and transverse section of rhizome (permanent slide).	s, whole mount of		Susanta Kumar Maity	
10	10. Pteris- Morphology, transverse section of racl sporophyll, wholemount of sporangium, whole m slides), transverse section of rhizome, whole mou organs and young sporophyte (permanent slide).	ount of spores (temporary		Susanta Kumar Maity	
11	11. Cycas- Morphology (coralloid roots, bulbil, le microsporophyll, transverse section of coralloid r rachis, vertical section of leaflet, vertical section of mount of spores (temporary slides), longitudinal s section of root (permanent slide).	oot, transverse section of of microsporophyll, whole		Susanta Kumar Maity	
12	12. Pinus- Morphology (long and dwarf shoots, w male and female cones), transverse section of Net stem, longitudinal section of / transverse section of microsporophyll, whole mount of Microspores longitudinal section of female cone, tangential longitudinal sections stem (permanent slide).	edle, transverse section of of male cone, whole mount (temporary slides),		Susanta Kumar Maity	
13	13. Gnetum- Morphology (stem, male & female of stem, vertical section of ovule (permanent slide)	cones), transverse section of		Susanta Kumar Maity	

I	14	14. Botanical excursion	Susanta	
			Kumar	
			Maity	

Curriculum Plan (ODD SEMESTER)
(Botany Honours: CBCS)

	(Bota	ny Honours; CBCS)			
Sei	mester III (AY 2020-2023)	Period: to			
_	per: CC5T (Anatomy of Angiosperms)	Full Marks: 40	Credit:04		
Sl. N o.	TOPICS		CLASSE S ALLOTE D	Class taken by	Rema rk
1	Unit 1: Introduction and scope of Plant Ana systematics, forensics and pharmacognosy.		(4 Lectures)	Susanta Kumar Maity	
2	Unit 2: Structure and Development of Plant plant body: The three tissue systems, types of plant body: polarity, cytodifferentiation embryogenic development, Root-stem transconcept.	of cells and tissues. Development and organogenesis during	(6 Lectures)	Susanta Kumar Maity	
3	Unit 3: Tissues Classification of tissues; Siphylogeny); cytodifferentiation of tracheary Pits and plasmodesmata; Wall ingrowths an incrustation, Ergastic substances. Hydathoclaticifers.	y elements and sieve elements; nd transfer cells, adcrustation and	(12Lectur es)	Susanta Kumar Maity	
4	Unit 4: Apical meristems: Evolution of con apex (Apical cell theory, Histogen theory, meristematic residue, cytohistological zona Structure of dicot and monocot stem. Origi diversity in size and shape of leaves; Struct Kranz anatomy. Organization of root apex theory, Korper-Kappe theory); Quiescent codicot and monocot root; Endodermis, exodo	Tunica Corpus theory, continuing ation); Types of vascular bundles; n, development, arrangement and ture of dicot and monocot leaf, (Apical cell theory, Histogen entre; Root cap; Structure of	(15 Lectures)	Susanta Kumar Maity	
5	Unit 5: Vascular Cambium and Wood Structure activity of cambium; Secondary growth in secondary growth in Bignonia, Boerhaavia, Axially and radially oriented elements; Typ Cyclic aspects and reaction wood; Sapwood diffuse porous wood; Early and late wood, Development and composition of periderm	root and stem. Anomalous , Aristolochia and Dracaena. pes of rays and axial parenchyma; d and heartwood; Ring and tyloses; Dendrochronology.	(15 Lectures)	Susanta Kumar Maity	
6	Unit 6: Adaptive and Protective Systems E epicuticular waxes, trichomes(uni-and mult nonglandular, two examples of each), stom and incrustation; Anatomical adaptations of Mechanical tissue – distribution and significant	ticellular, glandular and ata (classification); Adcrustation f xerophytes and hydrophytes.	(8 Lectures)	SusantaKu mar Maity	

Semes	ster III (AY 2020-2023)	Period:	to		
Paper (Pract	: CC5P (Anatomy of Angiosperms)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	<u>I</u>	CLASSE S ALLOTE D	Class taken by	Remark
1	Study of anatomical details through permanent mounts/ macerations/museum specimens with the examples. Apical meristem of root, shoot and vascular can	help of suitable	(20 Lectur es)	Susanta Kumar Maity	
	3. Distribution and types of parenchyma, collenchy4. Xylem: Tracheary elements-tracheids, vessel eleperforation plates; xylem fibres.	•			
	5. Wood: ring porous; diffuse porous; tyloses; hea6. Phloem: Sieve tubes-sieve plates; companion ce7. Epidermal system: cell types, stomata types; tricand glandular	ells; phloem fibres.			
	8. Root: monocot, dicot, secondary growth. 9. Stem: monocot, dicot - primary and secondary glenticels.	growth; periderm;			
	10. Leaf: isobilateral, dorsiventral, C4 leaves (Kra 11. Adaptive Anatomy: xerophytes, hydrophytes.	nz anatomy).			
	12. Secretory tissues: cavities, lithocysts and latici	fers.			

Semest	ter III (AY 2020-2023)	Period: t	0		
Paper:	CC6T (Economic Botany) (Theory)	Full Marks: 40	Credit:02		
S1. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Origin of Cultivated Plants: Concept of importance with reference to Vavilov's work. I introductions; Crop domestication and loss of gnew crops/varieties, importance of germplasm Unit 2: Cereals: Wheat and Rice (origin, morph management processing & uses); Brief account Unit 3: Legumes: Origin, morphology cultivatic Chick pea, Pigeon pea and fodder legumes. Imecosystem. Unit 4: Sources of sugars and starches: (Morph management and processing of sugarcane, procesugarcane industry. Potato — morphology, proputint 5: Spices: Listing of important spices, the Economic importance with special reference to black pepper Unit 6: Beverages: Tea, Coffee (morphology, punit 7: Sources of oils and fats: General descripant extraction, their uses and health implications groups soybean, mustard and coconut (Botanical name Oils: General account, extraction methods, contheir uses. Unit 8: Natural Rubber: Para-rubber: tapping, punit 9: Drug-yielding plants: Therapeutic and I special reference to Cinchona, Digitalis, Papav (Morphology, processing, uses and health haza Unit 10: Timber plants: General account with spine. Unit 11: Fibers: Classification based on the origand Jute (morphology, extraction and uses).	Examples of major plant genetic diversity; evolution of diversity. Inology, cultivation, to f millets. Ion, management and uses of portance to man and mology cultivation, ducts and by-products of magation & uses. Iir family and part used. In fennel, saffron, clove and morocessing & uses) Iption, classification, roundnut, coconut, linseed, e., family & uses). Essential inparison with fatty oils & processing and uses. Inhabit-forming drugs with er and Cannabis; Tobaccourds). Is pecial reference to teak and	(60 lectures)	Dr. Nilay Kumar Maitra	

Semes	ter III (AY 2020-2023)	Period:	to		
Paper:	CC6P (Economic Botany) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No.	1. Cereals: Wheat (habit sketch, L. S/T.S. greenerical tests) Rice (habit sketch, study of micro-chemical tests). 2. Legumes: Soybean, Groundnut, (habit, freenerical tests). 3. Sources of sugars and starches: Sugarcan micro-chemical tests), Potato (habit sketch, show localization of starch grains, w.m. startests). 4. Spices: Black pepper, Fennel and Clove (5. Beverages: Tea (plant specimen, tea leave beans). 6. Sources of oils and fats: Coconut-T.S. miseeds; tests for fats in crushed seeds. 7. Essential oil-yielding plants: Habit sketch and Eucalyptus (specimens/photographs). 8. Rubber: specimen, photograph/model of products. 9. Drug-yielding plants: Specimens of Digit 10. Tobacco: specimen and products of Tob 11. Woods: Tectona, Pinus: Specimen, Sect	paddy and grain, starch grains, uit, seed structure, microe (habit sketch; cane juicetuber morphology, T.S. tuber treh grains, micro-chemical habit and sections). es), Coffee (plant specimen, at, Mustard–plant specimen, at,	(24 lectures)	Dr. Nilay Kumar Maitra	
	12. Fiber-yielding plants: Cotton (specimen lint and fuzz; whole mount of fiber and test transverse section of stem, test for lignin on fiber).	for cellulose), Jute (specimen,			

Semes	ster III (AY 2020-2023)	Period:		to		
Paper:	CC7T (Genetics) (Theory)	Full Marks:	40	Cr	edit:04	
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian genetics and its extension Mendof inheritance; Chromosome theory of inheritance chromosomes; Probability and pedigree analysis; I codominance; Multiple alleles, Lethal alleles, Epis Recessive and Dominant traits, Penetrance and Ex Polygenic inheritance.	Autosomes and s Incomplete dominations, Pleiotropy,	ex ance and	(16 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Extrachromosomal Inheritance Chloroplas Four o'clock plant; Mitochondrial mutations in ye- coiling in snail; Infective heredity- Kappa particles	ast; Maternal effec		(6 lectures)	SkMd Ismail Al Amin	

3	Unit 3: Linkage, crossing over and chromosome mapping Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.	(12 lectures)	SkMd Ismail Al Amin
4	Unit 4: Variation in chromosome number and structure Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy	(8 lectures)	SkMd Ismail Al Amin
5	Unit 5: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation.DNA repair mechanisms.	(6 lectures)	SkMd Ismail Al Amin
6	Unit 6: Fine structure of gene Classical vs molecular concepts of gene; Cis- Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.	(6 lectures)	SkMd Ismail Al Amin
7	Unit 6. Population and Evolutionary Genetics Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	(6 lectures)	SkMd Ismail Al Amin

Semes	Semester III (AY 2020-2023) Period:		to		
Paper	: CC7P (Genetics) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Demonstration on pretreatment, fixation squash and smear preparation.	on, staining and	(40 lectures)	SkMd Ismail Al Amin	
2	2. Study of Mitosis from Onion / Garlic /	Lentil root.		SkMd Ismail Al Amin	
3	3. Study of Meiosis with pollen mother c Solanum / Datura by smear preparation.	ell (PMC) of Onion /		SkMd Ismail Al Amin	
4	4. Mendel's laws through seed ratios. Lal probability and chi-square.	boratory exercises in		SkMd Ismail Al Amin	
5	5. Chromosome mapping using point test	cross data.		SkMd Ismail Al Amin	
6	6. Pedigree analysis for dominant and recessex linked traits	essive autosomal and		SkMd Ismail Al Amin	
7	7. Incomplete dominance and gene interaratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4)	- C		SkMd Ismail Al Amin	
8	8. Blood Typing: groups & Rh factor.			SkMd Ismail Al Amin	

9	9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	SkMd Ismail Al Amin	
10	10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.	SkMd Ismail Al Amin	
11	11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe	SkMd Ismail Al Amin	

Semester III (AY 2020-2023) P		Period:	to		
Paper	: SEC1T (Biofertilizers) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS	1	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: General account about the microbes of Rhizobium – isolation, identification, mass massed inoculants, Actinorrhizal symbiosis.		(4 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Azospirillum: isolation and mass mul based inoculant, associative effect of different microorganisms. Azotobacter: classification, or response to Azotobacter inoculum, maintenant multiplication.	nt characteristics – crop	(8 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Cyanobacteria (blue green algae), Az azollae association, nitrogen fixation, factors green algae and Azolla in rice cultivation.		(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Mycorrhizal association, types of myctaxonomy, occurrence and distribution, phosp and yield – colonization of VAM – isolation production of VAM, and its influence on groplants.	phorus nutrition, growth and inoculum	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Organic farming – Green manuring a Recycling of biodegradable municipal, agricu wastes – biocompost making methods, types vermicomposting – field Application.	ultural and Industrial	(6 lectures)	Dr. Nilay Kumar Maitra	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Bottiny Honours, CDCS)					
Semes	ster IV (AY 2020-2023)	Period:	to		
Paper	CC8T (Molecular Biology) (Theory)	Full Marks:	Credi	t:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Nucleic acids: Carriers of genetic information perspective; DNA as the carrier of genetic information of the carrier of genetic informati		(60	SkMd Ismail	

	& Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.	lectures)	Al Amin	
2	Unit -2. The Structures of DNA and RNA / Genetic Material DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA-Prokaryotes, Viruses, Eukaryotes.RNA Structure-Organelle DNA mitochondria and chloroplast DNA.TheNucleosomeChromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.			
3	Unit- 2:The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.			
4	Unit- 3: Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)			
5	Unit 4: Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes:transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.	(60 lectures)	Susanta Kumar Maity	
6	Unit 5: Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.			
7	Unit 6: Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNAsynthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.			

Seme	Semester IV (AY 2020-2023) Period:		to		
Paper	Paper: CC8P (Molecular Biology) (Practical) Full Marks:		Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Preparation of LB medium and raising E.Coli. Isolation of genomic DNA from <i>E.Coli</i> .		(30 SkMd Ismail Al Amin		
	3. DNA isolation from cauliflower head.			&	
	4. DNA estimation by diphenylamine reagent/UV		Susanta		
	5. Study of DNA replication mechanisms through circle, Theta replication and semi-discontinuous		Kumar Maity		
	6. Study of structures of prokaryotic RNA polympolymerase II through photographs	erase and eukaryotic RNA			
	7. Photographs establishing nucleic acid as genet Stahl's, Avery et al, Griffith's, Hershey & Chase experiments)	,			
	8. Study of the following through photographs: A	Assembly of Spliceosome	1		

machinery; Splicing mechanism in group I & group II introns; Ribozyme and		
Alternative splicing.		

Semes	ster IV (AY 2020-2023)	Period:	to													
Paper: CC9T (Plant Ecology and Full Marks: Phytogeography) (Theory)		Full Marks:	Credit:													
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark											
1	1 ,		(60 lectures)	Dr. Nilay Kumar Maitra												
2	Unit 2: Soil Importance; Origin; Formation Physical; Chemical and Biological compound Role of climate in soil development.	•		Dr. Nilay Kumar Maitra												
3	Unit 3: Water Importance: States of wate Atmospheric moisture; Precipitation type hail, dew); Hydrological Cycle; Water in	s (rain, fog, snow,													Dr. Nilay Kumar Maitra	
4	Unit 4: Light, temperature, wind and fire adaptations of plants to their variation.	Variations;		Dr. Nilay Kumar Maitra												
5	Unit 5: Ecosystems Structure; Processes; organisation; Food chains and Food webs pyramids.	-		Dr. Nilay Kumar Maitra												
6	Unit 6: Population ecology Characteristic .Ecological Speciation	es and Dynamics		Dr. Nilay Kumar Maitra												
7	Unit 7: Plant communities Concept of eco Habitat and niche; Characters: analytical Ecotone and edge effect; Dynamics: succ types; climax concepts.	and synthetic;		Dr. Nilay Kumar Maitra												
8	Unit 8: Biotic interactions Trophic organion of energy, autotrophy, heterotrophy; symmony commensalism, parasitism; food chains a pyramids; biomass, standing crop.	biosis,		Dr. Nilay Kumar Maitra												
9	Unit 9: Functional aspects of ecosystem I of energy flow; Production and productive efficiencies; Biogeochemical cycles; Cyc	rity; Ecological		Dr. Nilay Kumar Maitra												

Nitrogen and Phosph	orus.		
of tolerance; Endem biomes (one each fro	mphy Principles; Continental drift; Theory sm; Brief description of major terrestrial m tropical, temperate & tundra); ivision of India; Local Vegetation.	Dr. Nilay Kumar Maitra	

Semes	ster IV (AY 2020-2023)	Period:	to		
-	: CC9P (Plant Ecology and geography) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measu variables: Soil thermometer, maximum thermometer, anemometer, psychromegauge and lux meter.	n and minimum	(36 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH of various soil meter, universal indicator/Lovibond co			Dr. Nilay Kumar Maitra	
3	3. Analysis for carbonates, chlorides, rorganic matter and base deficiency fro			Dr. Nilay Kumar Maitra	
4	4. two soil samples by rapid field tests			Dr. Nilay Kumar Maitra	
5	5. Determination of organic matter of Walkley& Black rapid titration	different soil samples by		Dr. Nilay Kumar Maitra	
6	6. method			Dr. Nilay Kumar Maitra	
7	7. Comparison of bulk density, porosit of water in soils of three habitats.	ty and rate of infiltration		Dr. Nilay Kumar Maitra	
8	8. Determination of dissolved oxygen polluted and unpolluted sources.	of water samples from		Dr. Nilay Kumar Maitra	
9	9. (a). Study of morphological adaptat xerophytes (four each). (b). Study of b following: Stem parasite (Cuscuta), Re Epiphytes, Predation (Insectivorous pl	piotic interactions of the oot parasite (Orobanche)		Dr. Nilay Kumar Maitra	
10	10. Determination of minimal quadrat herbaceous vegetation in the college c curve method (species to be listed).	-		Dr. Nilay Kumar Maitra	
11	11. Quantitative analysis of herbaceou college campus for frequency and com Raunkiaer's frequency distribution law	nparison with		Dr. Nilay Kumar Maitra	

12. Quantitative analysis of herbaceous vegetation for density	Dr. Nilay Kumar
and abundance in the college campus. 13. Field visit to familiarise students with ecology of different sites.	Maitra

Semes	ster IV (AY 2020-2023)	Period:	to		
Paper	: CC10T (Plant Systematics) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Significance of Plant systematics Intr Plant identification, Classification, Nomencle palynology, cytology, phytochemistry and m inventory; Functions of Herbarium; Importar gardens of the world and India; Virtual herba Documentation: Flora, Monographs, Journal and Multi-access.	ature. Evidences from tolecular data. Field nt herbaria and botanical arium; E-flora;	(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Taxonomic hierarchy Concept of taxaspecies); Categories and taxonomic hierarchy (taxonomic, biological, evolutionary).			Susanta Kumar Maity	
3	Unit 3: Botanical nomenclature Principles and names; Typification, author citation, valid of names, principle of priority and its limitation.	id publication, rejection		Susanta Kumar Maity	
4	Unit 4: Systems of classification Major contraction Theophrastus, Bauhin, Tournefort, Linnaeus, Bessey, Hutchinson, Takhtajan and Cronquis systems of Bentham and Hooker (upto series (upto series); Brief reference of Angiosperm (APG III) classification.	, Adanson, de Candolle, st; Classification and Engler and Prantl		Susanta Kumar Maity	
5	Unit 5: Biometrics, numerical taxonomy and Variations; OTUs, character weighting and c Phenograms, cladograms (definitions and dif	oding; Cluster analysis;		Susanta Kumar Maity	
6	Unit 6: Phylogeny of Angiosperms Terms and advanced, homology and analogy, parall monophyly, Paraphyly, polyphyly and clades of angiosperms; Co-evolution of angiosperm of illustrating evolutionary relationship (physicladogram).	elism and convergence, s). Origin and evolution is and animals; Methods		Susanta Kumar Maity	

Semes	ster IV (AY 2020-2023)	Period:	to		
Paper	CC10P (Plant Systematics) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	1. Study of vegetative and floral characters of the following		(36	Susanta Kumar	

2 2. Field visit (local) – Subject to grant of funds from the university. 3 3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book). Susanta Kumar Maity Susanta Kumar Maity		families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): 1. Ranunculaceae - Ranunculus, Delphinium. 2. Brassicaceae - Brassica, Alyssum / Iberis. 3. Malvaceae - Sida Sp. Urenalobota. 4. Myrtaceae - Eucalyptus, Callistemon 5. Umbelliferae - Coriandrum /Anethum / Foeniculum. 6. Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax. 7. Solanaceae - Solanum nigrum/Withania, Nicotina, Plumbaginefolia. 8. Lamiaceae - Salvia/Ocimum. 9. Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha. 10. Fasaceae - TephrosiaSp.,Crotalaria Sp., 11. Caesalpineaeceae - Cassia Sp., 12. Asclepiadaeceae- PesgulariaGygnema, 13. Apocynaceae - Hollorhen, Catharanthus. 14. Rubiaceae - Oldenladeae, Spermoeoceae, 15. Liliaceae - Asphodelus/Lilium/Allium.	lectures)	Maity	
university. Kumar Maity 3		16. Poaceae - Triticum/Hordeum/Avena.			
wild plant with herbarium label (to be submitted in the record Kumar	2	, , , ,		Kumar	
	3	wild plant with herbarium label (to be submitted in the record		Kumar	

Semes	ster IV (AY 2020-2023)	Period:	to		
Paper: SEC2T (Mushroom CultureTechnology) (Theory)		Full Marks: 40	Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove,			Dr.Nilay Kumar	

	sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	Maitra
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra
4	Unit 4: Food Preparation:Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra

ACADEMIC CALENDER (Botany Honours; CBCS)

Semes	ster V (AY 2020-2023)	Period:	to		
-	: CC11T (Reproductive Biology of osperms) (Theory)	Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction :History (contributions of G. E. Strasburger, S.G. Nawaschin, P. Maheshwari, B Heslop-Harrison) and scope.		(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Reproductive development : Induction of modified determinate shoot. Flower development: aspects.			Susanta Kumar Maity	
3	Unit 3: Anther and pollen biology Anther wall: Structure and functions, microsporogound its significance. Microgametogenesis; Pollen v germ unit) structure, NPC system; Palynology and Pollen wall proteins; Pollen viability, storage and g features: Pseudomonads, polyads, massulae, pollin	wall structure, MGU (male scope (a brief account); germination; Abnormal		Susanta Kumar Maity	
4	Unit 4: Ovule Structure; Types; Special structures—endothelium, obturator, aril, caruncle and hypostase; Female Gametophyte – megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis (details of			Susanta Kumar Maity	
5	Polygonumtype); Organization and ultrastructure of mature embryo sac. Unit 5: Pollination and fertilization Pollination types and significance; adaptations; structure of stigma and style; path of pollen tube in pistil; double fertilization.			Susanta Kumar Maity	
6	Unit 6: Self incompatibility Basic concepts (interspecific, intraspecific, homom GSI and SSI); Methods to overcome self- incompat bud pollination, stub pollination; Intra-ovarian and Modification of stigma surface, parasexual hybridiz fertilization.	ibility: mixed pollination, in vitro pollination;		Susanta Kumar Maity	
7	Unit 7: Embryo, Endosperm and Seed Structure and types; General pattern of developmen embryo and endosperm; Suspensor: structure and fu endosperm relationship; Nutrition of embryo; Unus development in <i>Paeonia</i> . Seed structure, importance mechanisms	unctions; Embryo- sual features; Embryo		Susanta Kumar Maity	

8	Units 7: Polyembryony and apomixis	Susanta	
	Introduction; Classification; Causes and applications.	Kumar	
		Maity	

Semes	ster V (AY 2020-2023)	Period:	to		
-	CC11P (Reproductive Biology of osperms) (Practical)	Full Marks: 20	Cı	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Anther: Wall and its ontogeny; Taglandular); MMC, spore tetrads, uninucleated anther stages through slides/micrographs, not through photographs and schematic representations.	e, bicelled and dehisced nale germ unit (MGU)	(40 lectures)	Susanta Kumar Maity	
2	2. Pollen grains: Fresh and acetolyzed show aperture, psuedomonads, polyads, pollinia (material), ultrastructure of pollen wall(micro Tetrazolium test.germination: Calculation of in different media using hanging drop method	wing ornamentation and slides/photographs,fresh graph); Pollen viability: percentage germination		Susanta Kumar Maity	
3	3. Ovule: Types-anatropous amphitropous/campylotropous, circinotropous Tenuinucellate and crassinucellate; Special s obturator, hypostase, caruncle and slides/specimens/photographs).	s, unitegmic, bitegmic; structures: Endothelium,		Susanta Kumar Maity	
4	4. Female gametophyte through permanent sli Types, ultrastructure of mature egg apparatus.			Susanta Kumar Maity	
5	5. Intra-ovarian pollination; Test tube photographs.	e pollination through		Susanta Kumar Maity	
6	6. Endosperm: Dissections of developing serfree-nuclear haustoria.	eds for endosperm with		Susanta Kumar Maity	
7	7. Embryogenesis: Study of development o permanent slides; dissection of developing various developmental stages; Study of sus micrographs	seeds for embryos at		Susanta Kumar Maity	

Semes	ster V (AY 2020-2023)	Period:	to		
Paper:	CC12T (Plant Physiology) (Theory)	Full Marks:	Cred	it:	
Sl. No.			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant-water relations Water Potential and its components, water absorption by roots,		(60	Dr.Nilay Kumar	

2	aquaporins, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sap – cohesion-tension theory. Transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement. Unit 2: Mineral nutrition Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.	lectures)	Maitra Dr.Nilay Kumar Maitra
3	Unit 3: Nutrient Uptake Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport.		Dr.Nilay Kumar Maitra
4	Unit 4: Translocation in the phloem Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.		Dr.Nilay Kumar Maitra
5	Unit 5: Plant growth regulators Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid.		Dr.Nilay Kumar Maitra
6	Unit 6: Physiology of flowering Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.		Dr.Nilay Kumar Maitra
7	Unit 7: Phytochrome, crytochromes and phototropins Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.		Dr.Nilay Kumar Maitra

Semester V (AY 2020-2023) Period: to					
Paper:	Paper: CC12P (Plant Physiology) (Practical) Full Marks: 20		Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determination of osmotic potential of plant comethod.	ell sap by plasmolytic	(40 lectures)	Dr.Nilay Kumar Maitra	
2	Determination of water potential of given weight method.	tissue (potato tuber) by		Dr.Nilay Kumar Maitra	
3	Study of the effect of wind velocity and transpiration in excised twig/leaf.	d light on the rate of	Dr.Nilay Kumar Maitra		
4	Calculation of stomatal index and stomatal surfaces of leaves of a mesophyte and xeroph			Dr.Nilay Kumar Maitra	
5	To calculate the area of an open stoma and open through stomata in a mesophyte and xer			Dr.Nilay Kumar Maitra	
6	To study the phenomenon of seed germinatio	n (effect of light).		Dr.Nilay Kumar Maitra	
7	To study the effect of different conce Avenacoleoptile elongation (IAA Bioassay).	entrations of IAA on		Dr.Nilay Kumar Maitra	

8	To study the induction of amylase activity in germinating barley grains.	Dr.Nilay Kumar Maitra
	Demonstration experiments	
	1. To demonstrate suction due to transpiration.	Dr.Nilay Kumar Maitra
	2. Fruit ripening/Rooting from cuttings (Demonstration).	Dr.Nilay Kumar Maitra
	3. Bolting experiment/Avenacoleptile bioassay (demonstration).	Dr.Nilay Kumar Maitra

Semes	ster V (AY 2020-2023)	Period:	to		
Paper:	Paper: DSE1 (Biostatistics) (Theory) Full Marks: 40		Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biostatistics Definition - statistical methods - basi - measurements, functions, limitations		(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Collection of data primary a Types and methods of data collection and demerits. Classification - tabulated data - sampling methods.	on procedures - merits		Dr.Nilay Kumar Maitra	
3	Unit 3:Measures of central tendence Mean, median, mode, geometric measures of dispersion - range, standeviation, quartile deviation - merital devi	nn - merits & demerits.		Dr.Nilay Kumar Maitra	
4	Unit 4: Correlation Types and methods of correlation regression equation, fitting predict dissimilarities of correlation and regression.	tion, similarities and		Dr.Nilay Kumar Maitra	
5	Unit 5: Statistical inference Hypothesis - simple hypothesis - stud test.	ent 't' test - chi square		Dr.Nilay Kumar Maitra	

Semes	ster V (AY 2020-2023)	Period:	to		
Paper: DSE 1P (Biostatistics) (Practical) Full Marks: 20 Credit:02			redit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Calculation of mean, standard deviation and standard error		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Calculation of correlation coefficient values and finding out the probability			Dr.Nilay Kumar	

		Maitra	
3	Calculation of 'F' value and finding out the probability value for the F value.	Dr.Nilay Kumar Maitra	

Semes	ter V (AY 2020-2023)	Period:	to		
Paper:	DSE2 (Plant Breeding) (Theory)	Full Marks: 40 Credit:04			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant Breeding Introduction and objectives. Breeding reproduction in crop plants. Importar undesirable consequences of plant breed	nt achievements and	(8 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Methods of crop improvement Introduction: Centres of origin and deplants, plant genetic resources; Acclin methods: For self pollinated, crovegetatively propagated plants; Hybrocoss and vegetatively propagated advantages and limitations.	omestication of crop matization; Selection oss pollinated and ridization: For self,	(8 lectures)	Susanta Kumar Maity	
3	Unit 3: Quantitative inheritance Concept, mechanism, examples of incolour in wheat, Skin colour in human polygenic Inheritance.		(8 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Inbreeding depression and he History, genetic basis of inbreeding heterosis; Applications.		(8 lectures)	Susanta Kumar Maity	
5	Unit 5: Crop improvement and breed Role of mutations; Polyploidy; Distant I role of biotechnology in crop improvem	hybridization and	(8 lectures)	SkMd Ismail Al Amin	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Period: to		(Botany H	onours; CBCS)			
Sl. No. TOPICS CLASSES Class taken by Remark taken by	Seme	ster VI (AY 2020-2023)	Period:	to		
1 Unit 1: Concept of metabolism Introduction, anabolic and catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosteric ,covalent modulation and Isozymes). Unit 2: Carbon assimilation Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction. Unit 3: Carbohydrate metabolism Synthesis and catabolism of sucrose and starch. Unit 4: Carbon Oxidation Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, mitochondrial electron transport, oxidative phosphorylation, cyanide-resistant respiration, factors affecting respiration. Unit 5: ATP-Synthesis Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendorf's experiment; role of uncouplers. Unit 6: Lipid metabolism Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation Unit 7: Nitrogen metabolism Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination. Unit 8: Mechanisms of signal transduction Receptor-ligand interactions; Second messenger concept, Calcium calmodulin,	Paper	: CC13T (Plant Metabolism) (Theory)	Full Marks:	Cred	it:	
catabolic pathways, regulation of metabolism, role of regulatory enzymes (allosterie ,covalent modulation and Isozymes). Unit 2: Carbon assimilation Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q eyele, CO2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction. Unit 3: Carbohydrate metabolism Synthesis and catabolism of sucrose and starch. Unit 4: Carbon Oxidation Glycolysis, fate of pyruvate, regulation of glycolysis, oxidative pentose phosphate pathway, oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle, amphibolic role, anaplerotic reactions, regulation of the cycle, mitochondrial electron transport, oxidative phosphorylation, cyamide-resistant respiration, factors affecting respiration. Unit 5: ATP-Synthesis Mechanism of ATP synthesis, substrate level phosphorylation, chemiosmotic mechanism (oxidative and photophosphorylation), ATP synthase, Boyers conformational model, Racker's experiment, Jagendort's experiment; role of uncouplers. Unit 6: Lipid metabolism Synthesis and breakdown of triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis and its role in mobilisation of lipids during seed germination, α oxidation Unit 7: Nitrogen metabolism Nitrate assimilation, biological nitrogen fixation (examples of legumes and non-legumes); Physiology and biochemistry of nitrogen fixation; Ammonia assimilation and transamination. Unit 8: Mechanisms of signal transduction Receptor-ligand interactions; Second messenger concept, Calcium calmodulin,	Sl. No.	TOPICS				Remark
Unit 8: Mechanisms of signal transduction Receptor-ligand interactions; Second messenger concept, Calcium calmodulin,	Sl. No.	Unit 1: Concept of metabolism Introduct catabolic pathways, regulation of metabor regulatory enzymes (allosteric ,covalent resolution). Unit 2: Carbon assimilation Historical bar photosynthetic pigments, role of photosy (chlorophylls and accessory pigments), a reaction centres, photochemical reactions electron transport, PSI, PSII, Q cycle, CO photorespiration, C4 pathways; Crassulate Factors affecting CO2 reduction. Unit 3: Carbohydrate metabolism Synthesucrose and starch. Unit 4: Carbon Oxidation Glycolysis, fat regulation of glycolysis, oxidative pentos oxidative decarboxylation of pyruvate, re NADH shuttle; TCA cycle, amphibolic rereactions, regulation of the cycle, mitoch transport, oxidative phosphorylation, cya respiration, factors affecting respiration. Unit 5: ATP-Synthesis Mechanism of Allevel phosphorylation, chemiosmotic meand photophosphorylation, chemiosmotic meand photophosphorylation, chemiosmotic meand photophosphorylation, at Racker's experiment; role of uncouplers. Unit 6: Lipid metabolism Synthesis and latriglycerides, β-oxidation, glyoxylate cycle and its role in mobilisation of lipids durin oxidation Unit 7: Nitrogen metabolism Nitrate assinitrogen fixation (examples of legumes a Physiology and biochemistry of nitrogen	ion, anabolic and olism, role of modulation and ockground, anthetic pigments and as, photosynthetic D2 reduction, cean acid metabolism; esis and catabolism of e of pyruvate, se phosphate pathway, egulation of PDH, ole, anaplerotic ondrial electron mide-resistant TP synthesis, substrate chanism (oxidative ee, Boyers ent, Jagendorf's oreakdown of ele, gluconeogenesis ag seed germination, α milation, biological and non-legumes);	CLASSES ALLOTED	Class taken by Dr.Nilay Kumar	Remark
		Unit 8: Mechanisms of signal transduction interactions; Second messenger concept,				

Seme	ster VI (AY 2020-2023)	Period:	to		
Paper	:: CC13P Plant Metabolism (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	 Chemical separation of photosynthetic. Experimental demonstration of Hill's. To study the effect of light intensity of photosynthesis. Effect of carbon dioxide on the rate of photosynthesis. To compare the rate of respiration in organic. To demonstrate activity of Nitrate recleaves of different plant sources. To study the activity of lipases in ger demonstrate mobilization of lipids 1. dute. Demonstration of fluorescence by isotropigments. Demonstration of absorption spectrum pigments 	s reaction. In the rate of If photosynthesis. Idifferent parts of a Iductase in germinating Iminating oilseeds and ring germination. Islated chlorophyll	(35 lectures)	Dr.Nilay Kumar Maitra	

Seme	ster VI (AY 2020-2023)	Period:	to		
Paper: CC14T (Plant Biotechnology) (Theory)		Full Marks:	Cred	it:	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit -1: Plant Tissue Culture Historical perspective Nutrient and hormone requirements (role of vitame Totipotency; Organogenesis; Embryogenesis (some Protoplast isolation, culture and fusion; Tissue culture (micropropagation, androgenesis, virus elimination production, haploids, triploids and hybrids; Cryope Conservation).	ins and hormones); latic and zygotic); ture applications n, secondary metabolite	(30 lectures)	Susanta Kumar Maity	
Unit- 2: Recombinant DNA technology Restriction E Types I-IV, biological role and application); Unit - 5: Applications of Biotechnology Pest resistant		,			
	resistant plants (RoundUp Ready soybean); Transg	, , , ,			

quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Gentically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.			
2 Unit- 2: Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC). Unit- 3:Gene Cloning Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCRmediated gene cloning; Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR Unit- 4: Methods of gene transfer Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics—selectable marker and reporter genes (Luciferase, GUS, GFP).	(30 lectures)	SkMd Ismail Al Amin	

Semester V (AY 2020-2023)		Period:	to		
Paper: CC14P () (Practical)		Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	(a) Preparation of MS medium. (b) Demosterilization and inoculation methods using tobacco, Datura, Brassica etc. Study of anther, embryo and endosperm somatic embryogenesis & artificial seeds the 3. Isolation of protoplasts.	leaf and nodal explants of culture, micropropagation,	(16 lectures)	Susanta Kumar Maity	
2	 Construction of restriction map of circular the data provided. Study of methods of gene transfer throug Agrobacterium-mediated, direct gene transfer by electroporation, microinjectic bombardment. Study of steps of genetic engineering for Golden rice, Flavr Savr tomato through phoses. Isolation of plasmid DNA. Restriction digestion and gel electrophore. 	h photographs: on, microprojectile production of Bt cotton, tographs.	(16 lectures)	SkMd Ismail Al Amin	

Semester VI (AY 2020-2023)	Period:	to	
Paper: DSE3 (Industrial and Environmental	Full Marks:	Credit:	

Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Scope of microbes in industry and environment Unit 2: Bioreactors/Fermenters and fermentation processes Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactorslaboratory, pilotscale and production fermenters; Constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and air-lift fermenter. A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations. Unit 3: Microbial production of industrial products Microorganisms involved,	(50 lectures)	SkMd Ismail Al Amin	
	media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme: amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin)		Susanta Kumar Maity	
	Unit 4: Microbial enzymes of industrial interest and enzyme immobilization Microorganisms for industrial applications_and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).			
	Unit 5: Microbes and quality of environment. Distribution of microbes in air; Isolation of microorganisms from soil, air and water.			
	Unit 6: Microbial flora of water. Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples.			
	Unit 7: Microbes in agriculture and remediation of contaminated soils. Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.			

Semeste	er VI (AY 2020-2023)	Period:	to		
-	OSE3 (Industrial and Environmental cology) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
	Principles and functioning of instruments in microbiology laboratory		(30 lectures)	SkMd Ismail Al Amin	
	2. Hands on sterilization techniques and preparation of culture media.			& Susanta Kumar	

Semes	ster VI (AY 2020-2023)	Period:	to		
Paper: DSE4 (Analytical Techniques in Plant Sciences) (Theory)		Full Marks:	Cred	it:	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Imaging and related techniques Emicroscopy; Light microscopy; Fluoresce Confocal microscopy; Use of fluorochron cytometry (FACS); (b) Applications of flimicroscopy: Chromosome banding, FISH painting; Transmission and Scanning elect sample preparation for electron microscopy negative staining, shadow casting, freeze etching. Unit- 2: Cell fractionation Centrifugation density gradient centrifugation, sucrose d CsCl2gradient, analytical centrifugation, marker enzymes. Unit- 3: Radioisotopes Use in biological radiography, pulse chase experiment. Unit- 4: Spectrophotometry Principle and biological research. Unit- 5: Chromatography Principle; Pape Column chromatography, TLC, GLC, HP chromatography; Molecular sieve chromatography. Unit- 6: Characterization of proteins and spectrometry; X-ray diffraction; X-ray cry Characterization of proteins and nucleic at AGE, PAGE, SDS-PAGE Unit- 7: Biostatistics Statistics, data, popuparameters; Representation of Data: Tabu Measures of central tendency: Arithmetic Measures of dispersion: Range, mean devistandard deviation; Chi-square test for go	ence microscopy; nes: (a) Flow uorescence I, chromosome etron microscopy – py, cryofixation, fracture, freeze : Differential and ensity gradient, ultracentrifugation, research, auto- I its application in r chromatography; PLC, Ionexchange atography; Affinity nucleic acids Mass systallography; acids; Electrophoresis: alation, samples, alar, Graphical; mean, mode, median; viation, variation,	(50 lectures)	SkMd Ismail Al Amin & Susanta Kumar Maity	

Semes	ster VI (AY 2020-2023)	Period:	to		
_	DSE4 (Analytical Techniques in Plant ces) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Study of Blotting techniques: Southern, Northern and Western, DNA		(30	SkMd Ismail Al	

fingerprinting, DNA sequencing, PCR through photographs.	lectures)	Amin
2. Demonstration of ELISA.		
3. To separate nitrogenous bases by paper chromatography.		&
4. To separate sugars by thin layer chromatography.		Susanta
5. Isolation of chloroplasts by differential centrifugation.		Susanta Kumar Maity
6. To separate chloroplast pigments by column chromatography.		
7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE.		
9. To separation DNA (marker) using AGE.		
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).11. Preparation of permanent slides (double staining)		

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

Semester I (AY 2019-2022) Period:		to			
Paper:	CC 1T(Phycology and Microbiology) (Theory)	Full Marks: 40+15	C	Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to microbial world growth and metabolism. Economic importance to vaccine production, role in a diagnostics, as causal organisms of plai importance of bacteria with reference to their industry (fermentation and medicine).	rtance of viruses with research, medicine and nt diseases. Economic r role in agriculture and	(7 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Viruses Discovery, physioche characteristics; classification (Baltimore), special reference to viroids and prions; replic DNA virus (T-phage), lytic and lysogenic cycles.	general structure with cation (general account), cle; RNA virus (TMV).	(7 lectures	SkMd Ismail Al Amin	
3	Unit 3: Bacteria Discovery, general archaebacteria, eubacteria, wall-less for spheroplasts); Cell structure; Nutritional vegetative, asexual and recombination (con and transduction).	ns (mycoplasma and types; Reproduction-	(7 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Algae General characteristics; Ecrange of thallus organization; Cell structure wall, pigment system, reserve food (of only g syllabus), flagella; methods of reproduction; system of Fritsch, and evolutionary classific groups) and Van – den Hoek et.al(1982); Sig important phycologists (F.E. Fritsch, G.M. S. Desikachary, H.D. Kumar, M.O.P. Iyengar environment, agriculture, biotechnology and	e and components; cell groups represented in the g Classification; criteria, ation of Lee (only upto nificant contributions of Smith, R.N. Singh, T.V.). Role of algae in the	(11 lectures)	Susanta Kumar Maity	
5	Unit 5: Cyanophyta and Xanthophyta Ec Range of thallus organization; Cell st Morphology and life-cycle of Nostoc and Van	ructure; Reproduction, ucheria.	(8 lectures)	Susanta Kumar Maity	
6	Unit 6: Chlorophyta and Charophyta Occurrence; Range of thallus organiz Reproduction. Morphology and life-cycle Volvox, Oedogonium, Coleochaete, Chara. E of Prochloron.	ation; Cell structure; s of <i>Chlamydomonas</i> , volutionary significance	(8 lectures)	Susanta Kumar Maity	
7	Unit 7: Phaeophyta and Rhodophyta: Char Range of thallus organization; Cell st Morphology and life-cycles of <i>Ectocarpus</i> , F	ructure; Reproduction.	(12 lectures)	Susanta Kumar Maity	

Semes	ster I (AY 2019-2022)	Period:		to		
Paper: CC 1P (Phycology and Microbiology) Full Marks (Practical)		Full Marks:	20	Cr	redit:02	
Sl. No.	TOPICS	1		CLASSES ALLOTED	Class taken by	Remark

1	Microbiology 1. Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle. 2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule. 3. Gram staining. 4. Endospore staining with malachite green using the (endospores taken from soil bacteria). 5. Study of bacteria from root nodules/Curd sample.	20	SkMd Ismail Al Amin
2	Phycology Study of vegetative and reproductive structures of Nostoc, <i>Chlamydomonas</i> (electron micrographs), Volvox, <i>Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus</i> and <i>Polysiphonia, Procholoron</i> through electron micrographs, temporary preparations and permanent slides.	20	Susanta Kumar Maity

Seme	ster I (AY 2019-2022)	Period:	to		
-	e: CC 2T (Biomolecules and Cell gy) (Theory)	Full Marks: 40+15		Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biomolecules: Types and signiff Structure and properties of water; pH ar Carbohydrates: Nomenclature and class Monosaccharides; Disaccharides; Oligo polysaccharides. Lipids: Definition and and structural lipids; Fatty acids structu Essential fatty acids; Triacylglycerols st properties; Phosphoglycerides. Proteins acids; Levels of protein structure-prima and quarternary; Protein denaturation at proteins. Nucleic acids: Structure of nitt and function of nucleotides; Types of RNA;	and buffers. diffication; dosaccharides and major classes of storage re and functions; tructure, functions and difficulty: dif	(20 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Bioenergenetics: Laws of them free energy, endergonic and exergonic reactions, redox reactions. ATP: structu currency molecule.	reactions, coupled	(4 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Enzymes: Structure of enzyme: cofactors, coenzymes and prosthetic greenzymes; Features of active site, substrumechanism of action (activation energy induced - fit theroy), Michaelis – Mente inhibition and factors affecting enzyme	oup; Classification of ate specificity, , lock and key hypothesis, en equation, enzyme	(6 lectures)	Dr. Nilay Kumar Maitra	
4	Unit4: The cell: Cell as a unit of structu	re and function;	(4	Dr. Nilay	

	Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).	lectures)	Kumar Maitra
5	Unit 5: Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.	(4 lectures)	Dr. NilayKumar Maitra
6	Unit 6: Cell organelles: Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export ofproteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes	(16 lectures)	Dr. Nilay Kumar Maitra
7	Unit 7: Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.	(6 lectures)	Dr. Nilay Kumar Maitra

Semes	ster I (AY 2019-2022)	Period:	to		
-	Paper: CC 2P (: Biomolecules and Cell Full Marks: 20 Biology) (Practical)		C	redit:02	
Sl. No.	TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	1. Qualitative tests for carbohydrates, recreducing sugars, lipids and proteins.	lucing sugars, non-	(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Study of plant cell structure with the h mount of Onion/Rhoeo /Crinum.	Study of plant cell structure with the help of epidermal peel ount of Onion/Rhoeo /Crinum.		Dr. Nilay Kumar Maitra	
3	3. Demonstration of the phenomenon of streaming in Hydrilla leaf.	protoplasmic		Dr. Nilay Kumar Maitra	
4	4. Measurement of cell size by the technic	ique of micrometry.		Dr. Nilay Kumar Maitra	
5	5. Counting the cells per unit volume with haemocytometer. (Yeast/pollen grains).	th the help of		Dr. Nilay Kumar Maitra	
6	6. Study of cell and its organelles with the micrographs.	e help of electron		Dr. Nilay Kumar Maitra	

7	7. Cytochemical staining of : DNA- Feulgen Actocarmin and AcetoOrcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	Dr. Nilay Kumar Maitra
8	8. Study the phenomenon of plasmolysis and deplasmolysis.	Dr. NilayKumar Maitra
9	9. Study the effect of organic solvent and temperature on membrane permeability.	Dr. Nilay Kumar Maitra
10	10. Study different stages of mitosis and meiosis.	Dr. Nilay Kumar Maitra

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	eter II (AY 2019-2022)	Period:	to		
-	CC 3T (Mycology and pathology) (Theory)	Full Marks: 40	(
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to true fungi: General of Affinities with plants and animals; Thallus wall composition; Nutrition; Classification.	organization; Cell	(6 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Chytridiomycota and Zygomycota: features; Ecology and significance; Thallus Reproduction; Life cycle with reference to Rhizopus.	organisation;	(5 lecture)	Dr. Nilay Kumar Maitra	
3	Unit 3: Ascomycota: General characteristic fruiting bodies); Ecology; Life cycle, Heter parasexuality; Life cycle and classification Saccharomyces, Aspergillus, Penicillium, A Neurospora and Peziza.	okaryosis and with reference to	(10 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Basidiomycota: General characteris cycle and Classification with reference to b wheat Puccinia (Physiological Specialization smut (symptoms only), Agaricus; Biolumin and Mushroom Cultivation with special reference.	lack stem rust on on), loose and covered nescence, Fairy Rings	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Allied Fungi: General characteristic molds, Classification; Occurrence; Types of fruiting bodies.		(3 lectures)	Dr. Nilay Kumar Maitra	
6	Unit 6: Oomycota: General characteristics; and classification with reference to Phytoph		(4 lectures)	Dr. Nilay Kumar Maitra	
7	Unit 7: Symbiotic associations Lichen: – O characteristics; Growth forms and range of Nature of associations of algal and fungal p Reproduction; Mycorrhiza-Ectomycorrhiza	thallus organization; partners;	(4 lectures)	Dr. Nilay Kumar Maitra	

	and their significance.		
8	Unit 8: Applied Mycology: Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.	(10 Lectures)	Dr. Nilay Kumar Maitra
9	Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine.	(10 lectures)	Dr. Nilay Kumar Maitra
10	Bacterial diseases: – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.	(10 lectures)	SkMdIsmail Al Amin

Seme	ster II (AY 2019-2022)	Period:	to		
-	: CC 3P(Mycology and pathology)(Practical)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Introduction to the world of fungi (Unicella coenocytic/septate mycelium, ascocarps&basical)		(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Rhizopus: study of asexual stage from temp sexual structures through permanent slides.	porary mounts and		Dr. Nilay Kumar Maitra	
3	3. Aspergillus and Penicillium: study of asexu temporary mounts. Study of Sexual stage from slides/photographs.	•		Dr. Nilay Kumar Maitra	
4	4. Peziza: Ascobulus sectioning through asco	carp.		Dr. Nilay Kumar Maitra	
5	5. Alternaria: Specimens/photographs and ten	nporary mounts.		Dr. Nilay Kumar Maitra	
6	6. Puccinia: Herbarium specimens of Black S and infected Barberry leaves; sections/ mount and permanent slides of both the hosts.			Dr. Nilay Kumar Maitra	
7	7. Agaricus: Specimens of button stage and fu sectioning of gills of Agaricus, fairy rings and mushrooms to be shown.	-		Dr. Nilay Kumar Maitra	
8	8. Study of phaneroplasmodium from actual s photograph. Study of Stemonitis sporangia.	pecimens and /or		Dr. Nilay Kumar Maitra	

9	9. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.		Dr. Nilay Kumar Maitra	
10	10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)		Dr. Nilay Kumar Maitra	
11	11. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.	(10 lectures)	SkMd Ismail Al Amin	

Semes	ster II (AY 2019-2022)	Period:	to		
Paper	: CC 4T (Archegoniate) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction: Unifying features of Transition to land habit; Alternation of ge	_	(4 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Bryophytes: General characteristi land habit; Classification; Range of thallu		(6 lectures)	SkMd Ismail Al Amin	
3	Unit 3: Type Studies:- Bryophytes Classifamily), morphology, anatomy and reproduction and explanatia, Pellia, Porella, Anthoceros, Sunaria; Pogonatum, Reproduction and explication, Marchantia, Plagichasma Anthoce (developmental stages not included). Eco importance of bryophytes with special results.	duction of Riccia, Sphagnum and volutionary trends in eros and Funaria logical and economic	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Pteridophytes: General characteric Early land plants (Cooksonia and Rhynia	·	(6 lectures)	Susanta Kumar Maity	
5	Unit 5: Type Studies-: Pteridophytes Class family), morphology, anatomy and reproduced Selaginella, Equisetum and Pteris (Develoto be included). Apogamy, and apospory, habit, telome theory, stelar evolution; Economic importance.	duction of Psilotum, opmental details not heterosporyandseed	(14 lectures)	Susanta Kumar Maity	
6	Unit 6: Gymnosperms: General character (up to family), morphology, anatomy and Cycas, Pinus and Gnetum (Developmenta included); Ecological and economic important	reproduction of al details not to be	(18 lectures)	Susanta Kumar Maity	

Semes	ster II (AY 2019-2022)	Period:	to		
Paper:	: CC 4P (Archegoniate) (Practical)	Full Marks: 20	Cı	redit:02	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	1. Riccia – Morphology of thallus.		(15 lectures)		
2	2. Marchantia- Morphology of thallus, whole mour vertical section of thallus through Gemma cup, who temporary slides), vertical section of Antheridioph- longitudinal section of Sporophyte (all permanents	rectures)	SkMd Ismail Al Amin		
3	3. Anthoceros- Morphology of thallus, dissection of stomata, spores, pseudoelaters, columella) (tempor of thallus (permanent slide).			SkMd Ismail Al Amin	
4	4. Pellia, Porella- Permanent slides.			SkMd Ismail Al Amin	
5	5. Sphagnum- Morphology of plant, whole mounts only).	of leaf (permanent slide		SkMd Ismail Al Amin	
6	6. Funaria- Pogonatum/ Polytrichum Morphology, rhizoids, operculum, peristome, annulus, spores (te permanent slides showing antheridial and archegor section of capsule and protonema.	emporary slides);		SkMd Ismail Al Amin	
7	7. Psilotum- Study of specimen, transverse section slide).	of synangium (permanent	(15 lectures)	Susanta Kumar Maity	
8	8. Selaginella- Morphology, whole mount of leaf w section of stem, whole mount of strobilus, whole m and megasporophyll (temporary slides), longitudin (permanent slide).	nount of microsporophyll		Susanta Kumar Maity	
9	9. Equisetum- Morphology, transverse section of in section of strobilus, transverse section of strobilus, sporangiophore, whole mount of spores (wet and d transverse section of rhizome (permanent slide).	whole mount of		Susanta Kumar Maity	
10	10. Pteris- Morphology, transverse section of rachi sporophyll, wholemount of sporangium, whole mos lides), transverse section of rhizome, whole moun organs and young sporophyte (permanent slide).	unt of spores (temporary		Susanta Kumar Maity	
11	11. Cycas- Morphology (coralloid roots, bulbil, lea microsporophyll, transverse section of coralloid root rachis, vertical section of leaflet, vertical section of mount of spores (temporary slides), longitudinal se section of root (permanent slide).	ot, transverse section of f microsporophyll, whole		Susanta Kumar Maity	
12	12. Pinus- Morphology (long and dwarf shoots, who male and female cones), transverse section of Needstem, longitudinal section of / transverse section of of microsporophyll, whole mount of Microspores (longitudinal section of female cone, tangential long longitudinal sections stem (permanent slide).	fle, transverse section of f male cone, whole mount (temporary slides),		Susanta Kumar Maity	
13	13. Gnetum- Morphology (stem, male & female co stem, vertical section of ovule (permanent slide)	ones), transverse section of		Susanta Kumar Maity	

14	14. Botanical excursion	Susanta	
		Kumar	
		Maity	

Curriculum Plan (ODD SEMESTER)
(Botany Honours: CBCS)

		ny Honours; CBCS)			
Sei	mester III (AY 2019-2022)	Period: to			
_	per: CC5T (Anatomy of Angiosperms) neory)	Full Marks: 40	Credit:04		
Sl. N o.	TOPICS		CLASSE S ALLOTE D	Class taken by	Rema rk
1	Unit 1: Introduction and scope of Plant Ana systematics, forensics and pharmacognosy.		(4 Lectures)	Susanta Kumar Maity	
2	Unit 2: Structure and Development of Plant plant body: The three tissue systems, types of plant body: polarity, cytodifferentiation embryogenic development, Root-stem transconcept.	of cells and tissues. Development and organogenesis during	(6 Lectures)	Susanta Kumar Maity	
3	Unit 3: Tissues Classification of tissues; Siphylogeny); cytodifferentiation of tracheary Pits and plasmodesmata; Wall ingrowths an incrustation, Ergastic substances. Hydathoclaticifers.	y elements and sieve elements; nd transfer cells, adcrustation and	(12Lectur es)	Susanta Kumar Maity	
4	Unit 4: Apical meristems: Evolution of con apex (Apical cell theory, Histogen theory, meristematic residue, cytohistological zona Structure of dicot and monocot stem. Origi diversity in size and shape of leaves; Struct Kranz anatomy. Organization of root apex theory, Korper-Kappe theory); Quiescent codicot and monocot root; Endodermis, exodo	Tunica Corpus theory, continuing ation); Types of vascular bundles; n, development, arrangement and ture of dicot and monocot leaf, (Apical cell theory, Histogen entre; Root cap; Structure of	(15 Lectures)	Susanta Kumar Maity	
5	Unit 5: Vascular Cambium and Wood Structure activity of cambium; Secondary growth in secondary growth in Bignonia, Boerhaavia, Axially and radially oriented elements; Typ Cyclic aspects and reaction wood; Sapwood diffuse porous wood; Early and late wood, Development and composition of periderm	root and stem. Anomalous , Aristolochia and Dracaena. pes of rays and axial parenchyma; d and heartwood; Ring and tyloses; Dendrochronology.	(15 Lectures)	Susanta Kumar Maity	
6	Unit 6: Adaptive and Protective Systems E epicuticular waxes, trichomes(uni-and mult nonglandular, two examples of each), stom and incrustation; Anatomical adaptations of Mechanical tissue – distribution and significant	ticellular, glandular and ata (classification); Aderustation f xerophytes and hydrophytes.	(8 Lectures)	SusantaKu mar Maity	

Semes	ster III (AY 2019-2022)	Period:	to		
Paper (Pract	: CC5P (Anatomy of Angiosperms)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	I	CLASSE S ALLOTE D	Class taken by	Remark
1	Study of anatomical details through permanent smounts/ macerations/museum specimens with the examples. Apical meristem of root, shoot and vascular can	help of suitable	(20 Lectur es)	Susanta Kumar Maity	
	Distribution and types of parenchyma, collenchy Xylem: Tracheary elements-tracheids, vessel elements perforation plates; xylem fibres.	•			
	5. Wood: ring porous; diffuse porous; tyloses; hea 6. Phloem: Sieve tubes-sieve plates; companion ce 7. Epidermal system: cell types, stomata types; tric and glandular	ells; phloem fibres.			
	8. Root: monocot, dicot, secondary growth. 9. Stem: monocot, dicot - primary and secondary glenticels.	growth; periderm;			
	10. Leaf: isobilateral, dorsiventral, C4 leaves (Kra 11. Adaptive Anatomy: xerophytes, hydrophytes.	nz anatomy).			
	12. Secretory tissues: cavities, lithocysts and latici	fers.			

Semester	r III (AY 2019-2022)	Period: t	0		
Paper: C	C6T (Economic Botany) (Theory)	Full Marks: 40	Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No.	Unit 1: Origin of Cultivated Plants: Concept of importance with reference to Vavilov's work. I introductions; Crop domestication and loss of gnew crops/varieties, importance of germplasm Unit 2: Cereals: Wheat and Rice (origin, morph management processing & uses); Brief accounts Unit 3: Legumes: Origin, morphology cultivatic Chick pea, Pigeon pea and fodder legumes. Impecosystem. Unit 4: Sources of sugars and starches: (Morph management and processing of sugarcane, procesugarcane industry. Potato — morphology, propulate Spices: Listing of important spices, the Economic importance with special reference to black pepper Unit 6: Beverages: Tea, Coffee (morphology, punit 7: Sources of oils and fats: General descripextraction, their uses and health implications groups soybean, mustard and coconut (Botanical name Oils: General account, extraction methods, contheir uses. Unit 8: Natural Rubber: Para-rubber: tapping, punit 9: Drug-yielding plants: Therapeutic and I special reference to Cinchona, Digitalis, Papav (Morphology, processing, uses and health haza Unit 10: Timber plants: General account with spine. Unit 11: Fibers: Classification based on the origand Jute (morphology, extraction and uses).	Examples of major plant genetic diversity; evolution of diversity. Inology, cultivation, to f millets. Ion, management and uses of portance to man and mology cultivation, ducts and by-products of magation & uses. Iir family and part used. In fennel, saffron, clove and morocessing & uses) Iption, classification, roundnut, coconut, linseed, e., family & uses). Essential inparison with fatty oils & processing and uses. Inhabit-forming drugs with er and Cannabis; Tobaccourds). Is pecial reference to teak and	(60 lectures)	Dr. Nilay Kumar Maitra	

Semes	ter III (AY 2019-2022)	Period:	to		
Paper:	CC6P (Economic Botany) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No.	1. Cereals: Wheat (habit sketch, L. S/T.S. gr chemical tests) Rice (habit sketch, study of pmicro-chemical tests). 2. Legumes: Soybean, Groundnut, (habit, frechemical tests). 3. Sources of sugars and starches: Sugarcane micro-chemical tests), Potato (habit sketch, show localization of starch grains, w.m. startests). 4. Spices: Black pepper, Fennel and Clove (5. Beverages: Tea (plant specimen, tea leave beans). 6. Sources of oils and fats: Coconut-T.S. nu seeds; tests for fats in crushed seeds. 7. Essential oil-yielding plants: Habit sketch and Eucalyptus (specimens/photographs). 8. Rubber: specimen, photograph/model of the products. 9. Drug-yielding plants: Specimens of Digitation Tobacco: specimen and products of Tobactories and products of Tobactories and products.	paddy and grain, starch grains, and, seed structure, micro- e (habit sketch; cane juice- tuber morphology, T.S. tuber to ch grains, micro-chemical habit and sections). es), Coffee (plant specimen, t, Mustard–plant specimen, of Rosa, Vetiveria, Santalum apping, samples of rubber alis, Papaver and Cannabis. acco. on of young stem.	(24 lectures)	Dr. Nilay Kumar Maitra	
	12. Fiber-yielding plants: Cotton (specimen, lint and fuzz; whole mount of fiber and test transverse section of stem, test for lignin on fiber).	whole mount of seed to show for cellulose), Jute (specimen,			

Semes	ster III (AY 2019-2022)	Period:		to		
Paper:	CC7T (Genetics) (Theory)	Full Marks:	40	Cr	edit:04	
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian genetics and its extension Mendof inheritance; Chromosome theory of inheritance chromosomes; Probability and pedigree analysis; I codominance; Multiple alleles, Lethal alleles, Epis Recessive and Dominant traits, Penetrance and Ex Polygenic inheritance.	Autosomes and s Incomplete dominations, Pleiotropy,	sex ance and	(16 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Extrachromosomal Inheritance Chloroplas Four o'clock plant; Mitochondrial mutations in ye- coiling in snail; Infective heredity- Kappa particles	ast; Maternal effec		(6 lectures)	SkMd Ismail Al Amin	

3	Unit 3: Linkage, crossing over and chromosome mapping Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Variation in chromosome number and structure Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy	(8 lectures)	SkMd Ismail Al Amin	
5	Unit 5: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation.DNA repair mechanisms.	(6 lectures)	SkMd Ismail Al Amin	
6	Unit 6: Fine structure of gene Classical vs molecular concepts of gene; Cis- Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.	(6 lectures)	SkMd Ismail Al Amin	
7	Unit 6. Population and Evolutionary Genetics Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	(6 lectures)	SkMd Ismail Al Amin	

Semes	ster III (AY 2019-2022)	Period:	to		
Paper	: CC7P (Genetics) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Demonstration on pretreatment, fixation squash and smear preparation.	on, staining and	(40 lectures)	SkMd Ismail Al Amin	
2	2. Study of Mitosis from Onion / Garlic /	Lentil root.		SkMd Ismail Al Amin	
3	3. Study of Meiosis with pollen mother c Solanum / Datura by smear preparation.	ell (PMC) of Onion /		SkMd Ismail Al Amin	
4	4. Mendel's laws through seed ratios. Lal probability and chi-square.	boratory exercises in		SkMd Ismail Al Amin	
5	5. Chromosome mapping using point test	cross data.		SkMd Ismail Al Amin	
6	6. Pedigree analysis for dominant and recessex linked traits	essive autosomal and		SkMd Ismail Al Amin	
7	7. Incomplete dominance and gene interaratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:			SkMd Ismail Al Amin	
8	8. Blood Typing: groups & Rh factor.			SkMd Ismail Al Amin	

9	9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	SkMd Ismail Al Amin	
10	10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.	SkMd Ismail Al Amin	
11	11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe	SkMd Ismail Al Amin	

Semester III (AY 2019-2022) Period:		Period:	to		
Paper:	SEC1T (Biofertilizers) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS	l	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: General account about the microbes un Rhizobium – isolation, identification, mass must based inoculants, Actinorrhizal symbiosis.		(4 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Azospirillum: isolation and mass mul based inoculant, associative effect of differen microorganisms. Azotobacter: classification, or response to Azotobacter inoculum, maintenar multiplication.	t characteristics – crop	(8 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Cyanobacteria (blue green algae), Aza azollae association, nitrogen fixation, factors green algae and Azolla in rice cultivation.		(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Mycorrhizal association, types of mycorrange and distribution, phosp and yield – colonization of VAM – isolation production of VAM, and its influence on grouplants.	ohorus nutrition, growth and inoculum	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Organic farming – Green manuring at Recycling of biodegradable municipal, agricu wastes – biocompost making methods, types vermicomposting – field Application.	ıltural and Industrial	(6 lectures)	Dr. Nilay Kumar Maitra	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Bouny Honours, edes)						
Semes	ster IV (AY 2019-2022)	Period:	to			
Paper	CC8T (Molecular Biology) (Theory)	Full Marks:	Credi	t:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	Unit- 1: Nucleic acids: Carriers of genetic information Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey		(60	SkMd Ismail		

	& Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.	lectures)	Al Amin
2	Unit -2. The Structures of DNA and RNA / Genetic Material DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA-Prokaryotes, Viruses, Eukaryotes.RNA Structure-Organelle DNA mitochondria and chloroplast DNA.TheNucleosomeChromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.		
3	Unit- 2:The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.		
4	Unit- 3: Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)		
5	Unit 4: Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes:transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.	(60 lectures)	Susanta Kumar Maity
6	Unit 5: Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.		
7	Unit 6: Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNAsynthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.		

Seme	ster IV (AY 2019-2022)	Period:	to		
Paper	Paper: CC8P (Molecular Biology) (Practical) Full Marks:		Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Preparation of LB medium and raising E.Coli. Isolation of genomic DNA from <i>E.Coli</i> .		(30 SkMd Ismail Al Amin		
	3. DNA isolation from cauliflower head.			&	
	4. DNA estimation by diphenylamine reagent/UV		Susanta		
	5. Study of DNA replication mechanisms through circle, Theta replication and semi-discontinuous			Kumar Maity	
	6. Study of structures of prokaryotic RNA polympolymerase II through photographs	erase and eukaryotic RNA			
	7. Photographs establishing nucleic acid as genet Stahl's, Avery et al, Griffith's, Hershey & Chase experiments)	,			
	8. Study of the following through photographs: A	Assembly of Spliceosome	-		

machinery; Splicing mechanism in group I & group II introns; Ribozyme and		
Alternative splicing.		

Semes	ster IV (AY 2019-2022)	Period:	to		
Paper: CC9T (Plant Ecology and Full Marks: Phytogeography) (Theory)		Credit:			
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	1 '		(60 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Soil Importance; Origin; Formatic Physical; Chemical and Biological compo Role of climate in soil development.	•		Dr. Nilay Kumar Maitra	
3	Unit 3: Water Importance: States of water Atmospheric moisture; Precipitation type hail, dew); Hydrological Cycle; Water in	s (rain, fog, snow,		Dr. Nilay Kumar Maitra	
4	Unit 4: Light, temperature, wind and fire adaptations of plants to their variation.	Variations;		Dr. Nilay Kumar Maitra	
5	Unit 5: Ecosystems Structure; Processes; organisation; Food chains and Food webs pyramids.	-		Dr. Nilay Kumar Maitra	
6	Unit 6: Population ecology Characteristic .Ecological Speciation	s and Dynamics		Dr. Nilay Kumar Maitra	
7	Unit 7: Plant communities Concept of ecc Habitat and niche; Characters: analytical Ecotone and edge effect; Dynamics: succ types; climax concepts.	and synthetic;		Dr. Nilay Kumar Maitra	
8	Unit 8: Biotic interactions Trophic organi of energy, autotrophy, heterotrophy; symcommensalism, parasitism; food chains a pyramids; biomass, standing crop.	biosis,		Dr. Nilay Kumar Maitra	
9	Unit 9: Functional aspects of ecosystem I of energy flow; Production and productive efficiencies; Biogeochemical cycles; Cyc	rity; Ecological		Dr. Nilay Kumar Maitra	

Nitrogen and Phosph	orus.		
of tolerance; Endem biomes (one each fro	mphy Principles; Continental drift; Theory sm; Brief description of major terrestrial m tropical, temperate & tundra); ivision of India; Local Vegetation.	Dr. Nilay Kumar Maitra	

Semes	ster IV (AY 2019-2022)	Period:	to		
Paper: CC9P (Plant Ecology and Full Marks: Phytogeography) (Practical)		Credit:			
Sl. No.	TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure variables: Soil thermometer, maximum thermometer, anemometer, psychrometer gauge and lux meter.	n and minimum	(36 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH of various soil meter, universal indicator/Lovibond co			Dr. Nilay Kumar Maitra	
3	3. Analysis for carbonates, chlorides, 1 organic matter and base deficiency fro			Dr. Nilay Kumar Maitra	
4	4. two soil samples by rapid field tests			Dr. Nilay Kumar Maitra	
5	5. Determination of organic matter of Walkley& Black rapid titration	different soil samples by		Dr. Nilay Kumar Maitra	
6	6. method			Dr. Nilay Kumar Maitra	
7	7. Comparison of bulk density, porosit of water in soils of three habitats.	ty and rate of infiltration		Dr. Nilay Kumar Maitra	
8	8. Determination of dissolved oxygen polluted and unpolluted sources.	of water samples from		Dr. Nilay Kumar Maitra	
9	9. (a). Study of morphological adaptat xerophytes (four each). (b). Study of b following: Stem parasite (Cuscuta), Ro Epiphytes, Predation (Insectivorous pl	oot parasite (Orobanche)		Dr. Nilay Kumar Maitra	
10	10. Determination of minimal quadrat herbaceous vegetation in the college curve method (species to be listed).			Dr. Nilay Kumar Maitra	
11	11. Quantitative analysis of herbaceou college campus for frequency and com Raunkiaer's frequency distribution law	nparison with		Dr. Nilay Kumar Maitra	

12	12. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus. 13. Field visit to familiarise students with ecology of different sites.	Ku	. Nilay mar nitra	
	inimitarise stadents with ecology of different sites.			

Semester IV (AY 2019-2022) Period:			to		
Paper:	: CC10T (Plant Systematics) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Significance of Plant systematics Intr Plant identification, Classification, Nomencla palynology, cytology, phytochemistry and m inventory; Functions of Herbarium; Importar gardens of the world and India; Virtual herba Documentation: Flora, Monographs, Journals and Multi-access.	ature. Evidences from olecular data. Field at herbaria and botanical rium; E-flora;	(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Taxonomic hierarchy Concept of taxa species); Categories and taxonomic hierarchy (taxonomic, biological, evolutionary).			Susanta Kumar Maity	
3	Unit 3: Botanical nomenclature Principles an and names; Typification, author citation, vali of names, principle of priority and its limitati	d publication, rejection		Susanta Kumar Maity	
4	Unit 4: Systems of classification Major contr Theophrastus, Bauhin, Tournefort, Linnaeus, Bessey, Hutchinson, Takhtajan and Cronquis systems of Bentham and Hooker (upto series (upto series); Brief reference of Angiosperm (APG III) classification.	Adanson, de Candolle, t; Classification) and Engler and Prantl		Susanta Kumar Maity	
5	Unit 5: Biometrics, numerical taxonomy and Variations; OTUs, character weighting and c Phenograms, cladograms (definitions and dif	oding; Cluster analysis;		Susanta Kumar Maity	
6	Unit 6: Phylogeny of Angiosperms Terms an and advanced, homology and analogy, parallemonophyly, Paraphyly, polyphyly and clades of angiosperms; Co-evolution of angiosperm of illustrating evolutionary relationship (phyloladogram).	elism and convergence, i). Origin and evolution s and animals; Methods		Susanta Kumar Maity	

Semes	ster IV (AY 2019-2022)	Period:	to		
Paper:	CC10P (Plant Systematics) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of vegetative and floral characte	rs of the following	(36	Susanta Kumar	

2 2. Field visit (local) – Subject to grant of funds from the university. 3 3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book). Susanta Kumar Maity Susanta Kumar Maity		families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): 1. Ranunculaceae - Ranunculus, Delphinium. 2. Brassicaceae - Brassica, Alyssum / Iberis. 3. Malvaceae - Sida Sp. Urenalobota. 4. Myrtaceae - Eucalyptus, Callistemon 5. Umbelliferae - Coriandrum /Anethum / Foeniculum. 6. Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax. 7. Solanaceae - Solanum nigrum/Withania, Nicotina, Plumbaginefolia. 8. Lamiaceae - Salvia/Ocimum. 9. Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha. 10. Fasaceae - TephrosiaSp.,Crotalaria Sp., 11. Caesalpineaeceae - Cassia Sp., 12. Asclepiadaeceae- PesgulariaGygnema, 13. Apocynaceae - Hollorhen, Catharanthus. 14. Rubiaceae - Oldenladeae, Spermoeoceae, 15. Liliaceae - Asphodelus/Lilium/Allium.	lectures)	Maity	
university. Kumar Maity 3		16. Poaceae - Triticum/Hordeum/Avena.			
wild plant with herbarium label (to be submitted in the record Kumar	2	, , , ,		Kumar	
	3	wild plant with herbarium label (to be submitted in the record		Kumar	

Semes	ster IV (AY 2019-2022)	Period:	to		
Paper:	SEC2T (Mushroom	Full Marks: 40	Credit:04		
Cultu	reTechnology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove,			Dr.Nilay Kumar	

	sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra
4	Unit 4: Food Preparation:Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra

Curriculum Plan (Botany Honours; CBCS)

Curriculum Plan (Botany Honours; CBCS)					
Semes	ter V (AY 2019-2022)	Period:	to		
	CC11T (Reproductive Biology of sperms) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction :History (contributions of G. E. Strasburger, S.G. Nawaschin, P. Maheshwari, F. Heslop-Harrison) and scope.		(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Reproductive development : Induction of modified determinate shoot. Flower development: aspects.	<u>U</u> ,		Susanta Kumar Maity	
3	Unit 3: Anther and pollen biology Anther wall: Structure and functions, microsporog and its significance. Microgametogenesis; Pollen germ unit) structure, NPC system; Palynology and Pollen wall proteins; Pollen viability, storage and features: Pseudomonads, polyads, massulae, pollin	wall structure, MGU (male I scope (a brief account); germination; Abnormal		Susanta Kumar Maity	
4	Unit 4: Ovule Structure; Types; Special structures—endothelium, obturator, aril, caruncle and hypostase; Female Gametophyte — megasporogenesis (monosporic, bisporic and tetrasporic) and megagametogenesis (details of Polygonumtype); Organization and ultrastructure of mature embryo sac.			Susanta Kumar Maity	
5	Unit 5: Pollination and fertilization Pollination types and significance; adaptations; strupath of pollen tube in pistil; double fertilization.			Susanta Kumar Maity	
6	Unit 6: Self incompatibility Basic concepts (interspecific, intraspecific, homory GSI and SSI); Methods to overcome self- incompa bud pollination, stub pollination; Intra-ovarian and Modification of stigma surface, parasexual hybridi fertilization.	tibility: mixed pollination, in vitro pollination;		Susanta Kumar Maity	
7	Unit 7: Embryo, Endosperm and Seed Structure and types; General pattern of development embryo and endosperm; Suspensor: structure and fundosperm relationship; Nutrition of embryo; Unu development in <i>Paeonia</i> . Seed structure, important mechanisms	functions; Embryosual features; Embryo		Susanta Kumar Maity	
8	Units 7: Polyembryony and apomixis Introduction; Classification; Causes and appli	cations.		Susanta Kumar Maity	

Semes	ster V (AY 2019-2022)	Period:	to		
-	Paper: CC11P (Reproductive Biology of Angiosperms) (Practical) Full Marks: 20		Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Anther: Wall and its ontogeny; Taglandular); MMC, spore tetrads, uninucleated anther stages through slides/micrographs, ruthrough photographs and schematic representations.	e, bicelled and dehisced nale germ unit (MGU)	(40 lectures)	Susanta Kumar Maity	
2	2. Pollen grains: Fresh and acetolyzed show aperture, psuedomonads, polyads, pollinia (material), ultrastructure of pollen wall(micro Tetrazolium test.germination: Calculation of in different media using hanging drop method	ving ornamentation and slides/photographs,fresh graph); Pollen viability: percentage germination		Susanta Kumar Maity	
3	3. Ovule: Types-anatropous amphitropous/campylotropous, circinotropous Tenuinucellate and crassinucellate; Special s obturator, hypostase, caruncle and slides/specimens/photographs).	s, unitegmic, bitegmic; structures: Endothelium,		Susanta Kumar Maity	
4	4. Female gametophyte through permanent sli Types, ultrastructure of mature egg apparatus			Susanta Kumar Maity	
5	5. Intra-ovarian pollination; Test tube photographs.	pollination through		Susanta Kumar Maity	
6	6. Endosperm: Dissections of developing serfree-nuclear haustoria.	eds for endosperm with		Susanta Kumar Maity	
7	7. Embryogenesis: Study of development of permanent slides; dissection of developing various developmental stages; Study of susmicrographs	seeds for embryos at		Susanta Kumar Maity	

Semes	ster V (AY 2019-2022)	Period:	to		
Paper:	CC12T (Plant Physiology) (Theory)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant-water relations Water Potential and its components, water aquaporins, pathway of water movement transmembrane pathways, root pressure, gu cohesion-tension theory. Transpiration a transpiration, antitranspirants, mechanism of	nt, symplast, apoplast, ttation. Ascent of sap – nd factors affecting	(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Mineral nutrition Essential and beneficial elements, macro and	micronutrients, methods		Dr.Nilay Kumar	

	of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.	Maitra
3	Unit 3: Nutrient Uptake Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport.	Dr.Nilay Kumar Maitra
4	Unit 4: Translocation in the phloem Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.	Dr.Nilay Kumar Maitra
5	Unit 5: Plant growth regulators Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid.	Dr.Nilay Kumar Maitra
6	Unit 6: Physiology of flowering Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.	Dr.Nilay Kumar Maitra
7	Unit 7: Phytochrome, crytochromes and phototropins Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.	Dr.Nilay Kumar Maitra

Semes	ster V (AY 2019-2022)	Period:	to		
Paper:	: CC12P (Plant Physiology) (Practical)	Full Marks: 20	Cı	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determination of osmotic potential of plant c method.	ell sap by plasmolytic	(40 lectures)	Dr.Nilay Kumar Maitra	
2	Determination of water potential of given weight method.	tissue (potato tuber) by		Dr.Nilay Kumar Maitra	
3	Study of the effect of wind velocity and transpiration in excised twig/leaf.	d light on the rate of		Dr.Nilay Kumar Maitra	
4	Calculation of stomatal index and stomatal frequency from the two surfaces of leaves of a mesophyte and xerophyte.			Dr.Nilay Kumar Maitra	
5	To calculate the area of an open stoma and open through stomata in a mesophyte and xer			Dr.Nilay Kumar Maitra	
6	To study the phenomenon of seed germinatio	n (effect of light).		Dr.Nilay Kumar Maitra	
7	To study the effect of different conce Avenacoleoptile elongation (IAA Bioassay).	entrations of IAA on		Dr.Nilay Kumar Maitra	
8	To study the induction of amylase activity grains.	y in germinating barley		Dr.Nilay Kumar Maitra	
	Demonstration experiments				

1. To demonstrate suction due to transpiration.	Dr.Nilay Kumar Maitra
2. Fruit ripening/Rooting from cuttings (Demonstration).	Dr.Nilay Kumar Maitra
3. Bolting experiment/Avenacoleptile bioassay (demonstration).	Dr.Nilay Kumar Maitra

Semester V (AY 2019-2022)		Period:	to		
Paper: DSE1 (Biostatistics) (Theory)		Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biostatistics Definition - statistical methods - basic - measurements, functions, limitations		(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Collection of data primary ar Types and methods of data collection and demerits. Classification - tabulatio data - sampling methods.	procedures - merits		Dr.Nilay Kumar Maitra	
3	Unit 3:Measures of central tendency Mean, median, mode, geometric mean Measures of dispersion - range, stand deviation, quartile deviation - merits efficient of variations.	- merits & demerits. dard deviation, mean		Dr.Nilay Kumar Maitra	
4	Unit 4: Correlation Types and methods of correlation, regression equation, fitting prediction dissimilarities of correlation and regres	on, similarities and		Dr.Nilay Kumar Maitra	
5	Unit 5: Statistical inference Hypothesis - simple hypothesis - studentest.			Dr.Nilay Kumar Maitra	

Semester V (AY 2019-2022)		Period:	to		
Paper: DSE 1P (Biostatistics) (Practical)		Full Marks: 20	Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Calculation of mean, standard deviation and standard error		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Calculation of correlation coefficient values and finding out the probability			Dr.Nilay Kumar Maitra	
3	Calculation of 'F' value and findin value for the F value.	g out the probability		Dr.Nilay Kumar Maitra	

Semes	Semester V (AY 2019-2022) Period:				
Paper:	DSE2 (Plant Breeding) (Theory)	Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant Breeding Introduction and objectives. Breeding reproduction in crop plants. Importar undesirable consequences of plant breed	nt achievements and	(8 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Methods of crop improvement Introduction: Centres of origin and do plants, plant genetic resources; Acclin methods: For self pollinated, crowegetatively propagated plants; Hybric cross and vegetatively propagated plants advantages and limitations.	omestication of crop matization; Selection oss pollinated and ridization: For self,	(8 lectures)	Susanta Kumar Maity	
3	Unit 3: Quantitative inheritance Concept, mechanism, examples of in colour in wheat, Skin colour in human polygenic Inheritance.		(8 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Inbreeding depression and he History, genetic basis of inbreedi heterosis; Applications.		(8 lectures)	Susanta Kumar Maity	
5	Unit 5: Crop improvement and breed Role of mutations; Polyploidy; Distant l role of biotechnology in crop improvem	hybridization and	(8 lectures)	SkMd Ismail Al Amin	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semester VI (AY 2019-2022)	Period:	to	

Paper: CC13T (Plant Metabolism) (Theory) Full Marks:			Cred	1t:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	Unit 1: Concept of metabolism Introduction catabolic pathways, regulation of metabolic regulatory enzymes (allosteric ,covalent isozymes).	lism, role of	(60 lectures)	Dr.Nilay Kumar Maitra		
	Unit 2: Carbon assimilation Historical background, photosynthetic pigments, role of photosynthetic pigments (chlorophylls and accessory pigments), antenna molecules and reaction centres, photochemical reactions, photosynthetic electron transport, PSI, PSII, Q cycle, CO2 reduction, photorespiration, C4 pathways; Crassulacean acid metabolism; Factors affecting CO2 reduction.					
	Unit 3: Carbohydrate metabolism Synthe sucrose and starch.	sis and catabolism of				
	Unit 4: Carbon Oxidation Glycolysis, fatoregulation of glycolysis, oxidative pentos oxidative decarboxylation of pyruvate, re NADH shuttle; TCA cycle,amphibolic roreactions, regulation of the cycle, mitochetransport, oxidative phosphorylation, cyarespiration, factors affecting respiration.	e phosphate pathway, egulation of PDH, ele, anaplerotic ondrial electron				
	Unit 5: ATP-Synthesis Mechanism of AT level phosphorylation, chemiosmotic med and photophosphorylation), ATP synthas conformational model, Racker's experiment; role of uncouplers.	chanism (oxidative e, Boyers				
	Unit 6: Lipid metabolism Synthesis and be triglycerides, β-oxidation, glyoxylate cycland its role in mobilisation of lipids during oxidation	le, gluconeogenesis				
	Unit 7: Nitrogen metabolism Nitrate assinitrogen fixation (examples of legumes a Physiology and biochemistry of nitrogen assimilation and transamination.	nd non-legumes);				
	Unit 8: Mechanisms of signal transduction interactions; Second messenger concept, MAP kinase cascade					

Semester VI (AY 2019-2022)	Period:	to
Paper: CC13P Plant Metabolism (Practical)	Full Marks:	Credit:

Sl. No.	TOPICS	CLASSES	Class	Remark
		ALLOTED	taken by	
1	1. Chemical separation of photosynthetic pigments.	(35	Dr.Nilay	
	2. Experimental demonstration of Hill's reaction.	lectures)	Kumar Maitra	
	3. To study the effect of light intensity on the rate of photosynthesis.			
	4. Effect of carbon dioxide on the rate of photosynthesis.			
	5. To compare the rate of respiration in different parts of a plant.			
	6. To demonstrate activity of Nitrate reductase in germinating leaves of different plant sources.			
	7. To study the activity of lipases in germinating oilseeds and demonstrate mobilization of lipids 1. during germination.			
	8. Demonstration of fluorescence by isolated chlorophyll pigments.			
	9. Demonstration of absorption spectrum of photosynthetic pigments			

Semester VI (AY 2019-2022)		Period:	to		
Paper	: CC14T (Plant Biotechnology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Nutrient and hormone requirements (role of vitami Totipotency; Organogenesis; Embryogenesis (som Protoplast isolation, culture and fusion; Tissue cult (micropropagation, androgenesis, virus elimination	-1: Plant Tissue Culture Historical perspective; Composition of media; ent and hormone requirements (role of vitamins and hormones); otency; Organogenesis; Embryogenesis (somatic and zygotic); plast isolation, culture and fusion; Tissue culture applications opropagation, androgenesis, virus elimination, secondary metabolite action, haploids, triploids and hybrids; Cryopreservation; Germplasm ervation).		Susanta Kumar Maity	
	Unit- 2: Recombinant DNA technology Restriction Endonucleases (History, Types I-IV, biological role and application);				
	Unit - 5: Applications of Biotechnology Pest resist resistant plants (RoundUp Ready soybean); Transg quality traits (Flavr Savr tomato, Golden rice); Impurarieties (Moondust carnations); Role of transgenic (Superbug); edible vaccines; Industrial enzymes (Albase); Gentically Engineered Products—Human Company (Page 1997).	genic crops with improved proved horticultural cs in bioremediation Aspergillase, Protease,			

Humulin; Biosafety concerns.			
2 Unit- 2: Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC Unit- 3:Gene Cloning Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCRmediated gene cloning; Gene Const construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR Unit- 4: Methods of gene transfer Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardmen Selection of transgenics—selectable marker and reporter genes (Luciferase GUS, GFP).	ruct;	SkMd Ismail Al Amin	

Semester V (AY 2019-2022)		Period:	to			
Paper:	CC14P () (Practical)	Full Marks:	Cred	it:	
Sl. No.		TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	(a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs.		(16 lectures)	Susanta Kumar Maity		
2	4. Construction	8. Isolation of protoplasts. 9. Construction of restriction map of circular and linear DNA from the data provided.		(16 lectures)	SkMd Ismail Al Amin	
	-	thods of gene transfer through-mediated, direct gene	gh photographs:			
	bombardment.	electroporation, microinject				
	Golden rice, F	ps of genetic engineering fo lavr Savr tomato through ph	•			
		plasmid DNA.	resis of plasmid DNA.			

Semes	ter VI (AY 2019-2022)	Period:	to		
-	Paper: DSE3 (Industrial and Environmental Microbiology) (Theory) Full Marks: Credit:		it:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark

1	II. '41. C	(50	SkMd
1	Unit 1: Scope of microbes in industry and environment	(50	Ismail Al
		lectures)	Amin
	Unit 2: Bioreactors/Fermenters and fermentation processes Solid-state and		Allilli
	liquid-state (stationary and submerged) fermentations; Batch and continuous		
	fermentations. Components of a typical bioreactor, Types of		
	bioreactorslaboratory, pilotscale and production fermenters; Constantly		
	stirred tank fermenter, tower fermenter, fixed bed and fluidized bed		
	bioreactors and air-lift fermenter. A visit to any educational institute/ industry		&
	to see an industrial fermenter, and other downstream processing operations.		
	Unit 3: Microbial production of industrial products Microorganisms involved,		
	media, fermentation conditions, downstream processing and uses; Filtration,		
	centrifugation, cell disruption, solvent extraction, precipitation and		Susanta
	ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations		Kumar
	for the production and estimation (qualitative and quantitative) of Enzyme:		Maity
	amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol		
	(Ethanol) and antibiotic (Penicillin)		
	Unit 4: Microbial enzymes of industrial interest and enzyme immobilization		
	Microorganisms for industrial applications_and hands on screening		
	microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis.		
	Methods of immobilization, advantages and applications of immobilization,		
	large scale applications of immobilized enzymes (glucose isomerase and		
	penicillin acylase).		
	Unit 5: Microbes and quality of environment. Distribution of microbes in air;		
	Isolation of microorganisms from soil, air and water.		
	Hait C. Minnelial Compacture Water at Hadisan and a Constant		
	Unit 6: Microbial flora of water. Water pollution, role of microbes in sewage		
	and domestic waste water treatment systems. Determination of BOD, COD,		
	TDS and TOC of water samples; Microorganisms as indicators of water		
	quality, check coliform and fecal coliform in water samples.		
	Unit 7: Microbes in agriculture and remediation of contaminated soils.		
	Biological fixation; Mycorrhizae; Bioremediation of contaminated soils.		
	Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in		
	plant roots.		

Semester VI (AY 2019-2022) Paper: DSE3 (Industrial and Environmental Microbiology) (Practical) Period: Full Marks:		Period:	to		
		Credit:			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Principles and functioning of instrum laboratory	Principles and functioning of instruments in microbiology boratory		SkMd Ismail Al Amin	
	2. Hands on sterilization techniques and preparation of culture media.			& Susanta Kumar Maity	

Semester VI (AY 2019-2022)	Period:	to

	: DSE4 (Analytical Techniques in Plant	Full Marks:	Cred	it:	
Scien	ces) (Theory)				
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Imaging and related techniques P microscopy; Light microscopy; Fluoresce Confocal microscopy; Use of fluorochron cytometry (FACS); (b) Applications of flumicroscopy: Chromosome banding, FISH painting; Transmission and Scanning elect sample preparation for electron microscopy negative staining, shadow casting, freeze etching. Unit- 2: Cell fractionation Centrifugation; density gradient centrifugation, sucrose de CsCl2gradient, analytical centrifugation, marker enzymes. Unit- 3: Radioisotopes Use in biological radiography, pulse chase experiment. Unit- 4: Spectrophotometry Principle and biological research. Unit- 5: Chromatography Principle; Paper Column chromatography, Molecular sieve chromather chromatography; Molecular sieve chromather chromatography. Unit- 6: Characterization of proteins and respectrometry; X-ray diffraction; X-ray cry Characterization of proteins and nucleic at AGE, PAGE, SDS-PAGE Unit- 7: Biostatistics Statistics, data, populparameters; Representation of Data: Tabus Measures of central tendency: Arithmetic Measures of dispersion: Range, mean devistandard deviation; Chi-square test for go	its application in r chromatography; LC, Ionexchange strography; Affinity nucleic acids Mass systallography; cids; Electrophoresis: alation, samples, alar, Graphical; mean, mode, median; riation, variation,	(50 lectures)	SkMd Ismail Al Amin & Susanta Kumar Maity	

Semes	ster VI (AY 2019-2022)	Period:	to		
-	: DSE4 (Analytical Techniques in Plant ces) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Study of Blotting techniques: Southern, Northern and Western, DNA fingerprinting, DNA sequencing, PCR through photographs. 2. Demonstration of ELISA.		(30 lectures)	SkMd Ismail Al Amin	

3. To separate nitrogenous bases by paper chromatography.	&
4. To separate sugars by thin layer chromatography.	
5. Isolation of chloroplasts by differential centrifugation.	Susanta Kumar
6. To separate chloroplast pigments by column chromatography.	Maity
7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE.	
9. To separation DNA (marker) using AGE.	
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).	
11. Preparation of permanent slides (double staining)	

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

Semes	ster I (AY 2018-2021)	Period:	to		
Paper:	CC 1T(Phycology and Microbiology) (Theory)	Full Marks: 40+15	C	Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to microbial world growth and metabolism. Economic importance to vaccine production, role in diagnostics, as causal organisms of plan importance of bacteria with reference to their industry (fermentation and medicine).	rtance of viruses with research, medicine and nt diseases. Economic	(7 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Viruses Discovery, physioche characteristics; classification (Baltimore), special reference to viroids and prions; replic DNA virus (T-phage), lytic and lysogenic cycles.	general structure with cation (general account),	(7 lectures	SkMd Ismail Al Amin	
3	Unit 3: Bacteria Discovery, general archaebacteria, eubacteria, wall-less for spheroplasts); Cell structure; Nutritional vegetative, asexual and recombination (con and transduction).	ms (mycoplasma and types; Reproduction-	(7 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Algae General characteristics; Ec range of thallus organization; Cell structur wall, pigment system, reserve food (of only g syllabus), flagella; methods of reproductions system of Fritsch, and evolutionary classific groups) and Van – den Hoek et.al(1982); Sig important phycologists (F.E. Fritsch, G.M. S Desikachary, H.D. Kumar, M.O.P. Iyengar environment, agriculture, biotechnology and	e and components; cell groups represented in the g Classification; criteria, attion of Lee (only upto mificant contributions of Smith, R.N. Singh, T.V.). Role of algae in the	(11 lectures)	Susanta Kumar Maity	
5	Unit 5: Cyanophyta and Xanthophyta Ec Range of thallus organization; Cell st Morphology and life-cycle of Nostoc and Van	ructure; Reproduction,	(8 lectures)	Susanta Kumar Maity	
6	Unit 6: Chlorophyta and Charophyta Occurrence; Range of thallus organiz Reproduction. Morphology and life-cycle Volvox, Oedogonium, Coleochaete, Chara. E of Prochloron.	ation; Cell structure; es of <i>Chlamydomonas</i> ,	(8 lectures)	Susanta Kumar Maity	
7	Unit 7: Phaeophyta and Rhodophyta: Char Range of thallus organization; Cell st Morphology and life-cycles of <i>Ectocarpus</i> , F	ructure; Reproduction.	(12 lectures)	Susanta Kumar Maity	

Semes	ster I (AY 2018-2021)	Period:		to		
Paper: (Pract	CC 1P (Phycology and Microbiology) ical)	Full Marks:	20	Cr	redit:02	
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark

1	Microbiology 1. Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle. 2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule. 3. Gram staining. 4. Endospore staining with malachite green using the (endospores taken from soil bacteria). 5. Study of bacteria from root nodules/Curd sample.	20	SkMd Ismail Al Amin	
2	Phycology Study of vegetative and reproductive structures of Nostoc, <i>Chlamydomonas</i> (electron micrographs), Volvox, <i>Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus</i> and <i>Polysiphonia, Procholoron</i> through electron micrographs, temporary preparations and permanent slides.	20	Susanta Kumar Maity	

Semes	ster I (AY 2018-2021)	Period:	to		
	: CC 2T (Biomolecules and Cell gy) (Theory)	Full Marks: 40+15		Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biomolecules: Types and significar Structure and properties of water; pH and be Carbohydrates: Nomenclature and classific Monosaccharides; Disaccharides; Oligosa polysaccharides. Lipids: Definition and may and structural lipids; Fatty acids structure at Essential fatty acids; Triacylglycerols structure properties; Phosphoglycerides. Proteins: Structure-primary, and quarternary; Protein denaturation and liproteins. Nucleic acids: Structure of nitrog and function of nucleotides; Types of nuclea, B, Z types of DNA; Types of RNA; Structure of RNA; Structure of DNA; Types of RNA; Structure of Structure of DNA; Types of RNA; Structure of Structure of DNA; Types of RNA; Structure of DNA; Type	cution; ccharides and ujor classes of storage and functions; cture, functions and tructure of amino secondary, tertiary biological roles of enous bases; Structure eic acids; Structure of	(20 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Bioenergenetics: Laws of thermod free energy, endergonic and exergonic reac reactions, redox reactions. ATP: structure, currency molecule.	ctions, coupled	(4 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Enzymes: Structure of enzyme: hol cofactors, coenzymes and prosthetic group enzymes; Features of active site, substrate mechanism of action (activation energy, lo induced - fit theroy), Michaelis – Menten einhibition and factors affecting enzyme act	; Classification of specificity, ck and key hypothesis, equation, enzyme	(6 lectures)	Dr. Nilay Kumar Maitra	
4	Unit4: The cell: Cell as a unit of structure a	and functions	(4	Dr. Nilay	

	Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).	lectures)	Kumar Maitra
5	Unit 5: Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.	(4 lectures)	Dr. NilayKumar Maitra
6	Unit 6: Cell organelles: Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export ofproteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes	(16 lectures)	Dr. Nilay Kumar Maitra
7	Unit 7: Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.	(6 lectures)	Dr. Nilay Kumar Maitra

Semes	ster I (AY 2018-2021)	Period:	to		
-	Paper: CC 2P (: Biomolecules and Cell Full Marks: 20 Biology) (Practical)		C	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Qualitative tests for carbohydrates, recreducing sugars, lipids and proteins.	lucing sugars, non-	(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Study of plant cell structure with the h mount of Onion/Rhoeo /Crinum.	elp of epidermal peel		Dr. Nilay Kumar Maitra	
3	3. Demonstration of the phenomenon of streaming in Hydrilla leaf.	protoplasmic		Dr. Nilay Kumar Maitra	
4	4. Measurement of cell size by the technic	ique of micrometry.		Dr. Nilay Kumar Maitra	
5	5. Counting the cells per unit volume with haemocytometer. (Yeast/pollen grains).	th the help of		Dr. Nilay Kumar Maitra	
6	6. Study of cell and its organelles with the micrographs.	e help of electron		Dr. Nilay Kumar Maitra	

7	7. Cytochemical staining of : DNA- Feulgen Actocarmin and AcetoOrcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	Dr. Nilay Kumar Maitra
8	8. Study the phenomenon of plasmolysis and deplasmolysis.	Dr. NilayKumar Maitra
9	9. Study the effect of organic solvent and temperature on membrane permeability.	Dr. Nilay Kumar Maitra
10	10. Study different stages of mitosis and meiosis.	Dr. Nilay Kumar Maitra

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	ter II (AY 2018-2021)	Period:	to		
-	Paper: CC 3T (Mycology and Phytopathology) (Theory) Full Marks: 40			Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to true fungi: General of Affinities with plants and animals; Thallus wall composition; Nutrition; Classification.	organization; Cell	(6 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Chytridiomycota and Zygomycota: features; Ecology and significance; Thallus Reproduction; Life cycle with reference to Rhizopus.	organisation;	(5 lecture)	Dr. Nilay Kumar Maitra	
3	Unit 3: Ascomycota: General characteristic fruiting bodies); Ecology; Life cycle, Heter parasexuality; Life cycle and classification Saccharomyces, Aspergillus, Penicillium, A Neurospora and Peziza.	okaryosis and with reference to	(10 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Basidiomycota: General characteriscycle and Classification with reference to bwheat Puccinia (Physiological Specializationsmut (symptoms only), Agaricus; Biolumin and Mushroom Cultivation with special refembashroom.	lack stem rust on on), loose and covered sescence, Fairy Rings	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Allied Fungi: General characteristic molds, Classification; Occurrence; Types o fruiting bodies.		(3 lectures)	Dr. Nilay Kumar Maitra	
6	Unit 6: Oomycota: General characteristics; and classification with reference to Phytoph		(4 lectures)	Dr. Nilay Kumar Maitra	
7	Unit 7: Symbiotic associations Lichen: – O characteristics; Growth forms and range of Nature of associations of algal and fungal p Reproduction; Mycorrhiza-Ectomycorrhiza	thallus organization; partners;	(4 lectures)	Dr. Nilay Kumar Maitra	

	and their significance.		
8	Unit 8: Applied Mycology: Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.	(10 Lectures)	Dr. Nilay Kumar Maitra
9	Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine.	(10 lectures)	Dr. Nilay Kumar Maitra
10	Bacterial diseases: – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.	(10 lectures)	SkMdIsmail Al Amin

Semes	ster II (AY 2018-2021)	Period:	to		
Paper: CC 3P(Mycology and Full Marks: 20 Phytopathology)(Practical)			Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Introduction to the world of fungi (Unicellu coenocytic/septate mycelium, ascocarps&basical)		(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Rhizopus: study of asexual stage from temp sexual structures through permanent slides.	porary mounts and		Dr. Nilay Kumar Maitra	
3	3. Aspergillus and Penicillium: study of asexu temporary mounts. Study of Sexual stage from slides/photographs.	-		Dr. Nilay Kumar Maitra	
4	4. Peziza: Ascobulus sectioning through ascoo	carp.		Dr. Nilay Kumar Maitra	
5	5. Alternaria: Specimens/photographs and ten	nporary mounts.		Dr. Nilay Kumar Maitra	
6	6. Puccinia: Herbarium specimens of Black S and infected Barberry leaves; sections/ mount and permanent slides of both the hosts.			Dr. Nilay Kumar Maitra	
7	7. Agaricus: Specimens of button stage and fu sectioning of gills of Agaricus, fairy rings and mushrooms to be shown.			Dr. Nilay Kumar Maitra	
8	8. Study of phaneroplasmodium from actual s photograph. Study of Stemonitis sporangia.	pecimens and /or	-	Dr. Nilay Kumar Maitra	

9	9. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.		Dr. Nilay Kumar Maitra	
10	10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)		Dr. Nilay Kumar Maitra	
11	11. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.	(10 lectures)	SkMd Ismail Al Amin	

Semes	ster II (AY 2018-2021)	Period:	to		
Paper	: CC 4T (Archegoniate) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS	<u>I</u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction: Unifying features o Transition to land habit; Alternation of g	•	(4 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Bryophytes: General characterist land habit; Classification; Range of thall		(6 lectures)	SkMd Ismail Al Amin	
3	Unit 3: Type Studies:- Bryophytes Class family), morphology, anatomy and repro Marchantia, Pellia, Porella, Anthoceros, Funaria; Pogonatum,Reproduction and e Riccia, Marchantia, PlagichasmaAnthoce (developmental stages not included). Eccimportance of bryophytes with special re	duction of Riccia, Sphagnum and volutionary trends in eros and Funaria ological and economic	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Pteridophytes: General character Early land plants (Cooksonia and Rhynia		(6 lectures)	Susanta Kumar Maity	
5	Unit 5: Type Studies-: Pteridophytes Cla family), morphology, anatomy and repro Selaginella, Equisetum and Pteris (Devel to be included). Apogamy, and apospory, habit, telome theory, stelar evolution; Ec economic importance.	duction of Psilotum, opmental details not heterosporyandseed	(14 lectures)	Susanta Kumar Maity	
6	Unit 6: Gymnosperms: General character (up to family), morphology, anatomy and Cycas, Pinus and Gnetum (Development included); Ecological and economic important	d reproduction of al details not to be	(18 lectures)	Susanta Kumar Maity	

Semes	ster II (AY 2018-2021)	Period:	to		
Paper:	: CC 4P (Archegoniate) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Riccia – Morphology of thallus.		(15 lectures)		
2	2. Marchantia- Morphology of thallus, whole mour vertical section of thallus through Gemma cup, who temporary slides), vertical section of Antheridioph- longitudinal section of Sporophyte (all permanents	ole mount of Gemmae (all ore, Archegoniophore,	rectures)	SkMd Ismail Al Amin	
3	3. Anthoceros- Morphology of thallus, dissection of stomata, spores, pseudoelaters, columella) (tempor of thallus (permanent slide).			SkMd Ismail Al Amin	
4	4. Pellia, Porella- Permanent slides.			SkMd Ismail Al Amin	
5	5. Sphagnum- Morphology of plant, whole mounts only).	of leaf (permanent slide		SkMd Ismail Al Amin	
6	6. Funaria- Pogonatum/ Polytrichum Morphology, rhizoids, operculum, peristome, annulus, spores (te permanent slides showing antheridial and archegor section of capsule and protonema.	emporary slides);		SkMd Ismail Al Amin	
7	7. Psilotum- Study of specimen, transverse section slide).	of synangium (permanent	(15 lectures)	Susanta Kumar Maity	
8	8. Selaginella- Morphology, whole mount of leaf w section of stem, whole mount of strobilus, whole m and megasporophyll (temporary slides), longitudin (permanent slide).	nount of microsporophyll		Susanta Kumar Maity	
9	9. Equisetum- Morphology, transverse section of in section of strobilus, transverse section of strobilus, sporangiophore, whole mount of spores (wet and d transverse section of rhizome (permanent slide).	whole mount of		Susanta Kumar Maity	
10	10. Pteris- Morphology, transverse section of rachi sporophyll, wholemount of sporangium, whole mos lides), transverse section of rhizome, whole moun organs and young sporophyte (permanent slide).	unt of spores (temporary		Susanta Kumar Maity	
11	11. Cycas- Morphology (coralloid roots, bulbil, lea microsporophyll, transverse section of coralloid root rachis, vertical section of leaflet, vertical section of mount of spores (temporary slides), longitudinal se section of root (permanent slide).	ot, transverse section of f microsporophyll, whole		Susanta Kumar Maity	
12	12. Pinus- Morphology (long and dwarf shoots, who male and female cones), transverse section of Needstem, longitudinal section of / transverse section of of microsporophyll, whole mount of Microspores (longitudinal section of female cone, tangential long longitudinal sections stem (permanent slide).	fle, transverse section of male cone, whole mount temporary slides),		Susanta Kumar Maity	
13	13. Gnetum- Morphology (stem, male & female co stem, vertical section of ovule (permanent slide)	ones), transverse section of		Susanta Kumar Maity	

I	14	14. Botanical excursion	Susanta	
			Kumar	
			Maity	

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

	(Botai	ny Honours; CBCS)			
Sen	nester III (AY 2018-2021)	Period: to			
_	eer: CC5T (Anatomy of Angiosperms)	Full Marks: 40	Credit:04		
Sl. N o.	TOPICS		CLASSE S ALLOTE D	Class taken by	Rema rk
1	Unit 1: Introduction and scope of Plant Ana systematics, forensics and pharmacognosy.		(4 Lectures)	Susanta Kumar Maity	
2	Unit 2: Structure and Development of Plant plant body: The three tissue systems, types of plant body: polarity, cytodifferentiation a embryogenic development, Root-stem transconcept.	of cells and tissues. Development and organogenesis during	(6 Lectures)	Susanta Kumar Maity	
3	Unit 3: Tissues Classification of tissues; Sin phylogeny); cytodifferentiation of tracheary Pits and plasmodesmata; Wall ingrowths an incrustation, Ergastic substances. Hydathod laticifers.	elements and sieve elements; and transfer cells, adcrustation and	(12Lectur es)	Susanta Kumar Maity	
4	Unit 4: Apical meristems: Evolution of con apex (Apical cell theory, Histogen theory, Terristematic residue, cytohistological zona Structure of dicot and monocot stem. Origin diversity in size and shape of leaves; Struct Kranz anatomy. Organization of root apex (theory, Korper-Kappe theory); Quiescent con dicot and monocot root; Endodermis, exode	Funica Corpus theory, continuing tion); Types of vascular bundles; n, development, arrangement and ure of dicot and monocot leaf, (Apical cell theory, Histogen entre; Root cap; Structure of	(15 Lectures)	Susanta Kumar Maity	
5	Unit 5: Vascular Cambium and Wood Structure activity of cambium; Secondary growth in secondary growth in Bignonia, Boerhaavia, Axially and radially oriented elements; Typ Cyclic aspects and reaction wood; Sapwood diffuse porous wood; Early and late wood, Development and composition of periderm,	root and stem. Anomalous Aristolochia and Dracaena. ses of rays and axial parenchyma; d and heartwood; Ring and tyloses; Dendrochronology.	(15 Lectures)	Susanta Kumar Maity	
6	Unit 6: Adaptive and Protective Systems Epericuticular waxes, trichomes(uni-and mult nonglandular, two examples of each), stoma and incrustation; Anatomical adaptations of Mechanical tissue – distribution and significant	icellular, glandular and ata (classification); Adcrustation f xerophytes and hydrophytes.	(8 Lectures)	SusantaKu mar Maity	

Semes	ster III (AY 2018-2021)	Period:	to		
Paper: CC5P (Anatomy of Angiosperms) (Practical)		Full Marks: 20		Credit:02	
Sl. No.	TOPICS		CLASSE S ALLOTE D	Class taken by	Remark
1	Study of anatomical details through permanent s mounts/ macerations/museum specimens with the l examples. Apical meristem of root, shoot and vascular cam.	help of suitable	(20 Lectur es)	Susanta Kumar Maity	
	 Distribution and types of parenchyma, collenchy Xylem: Tracheary elements-tracheids, vessel eleperforation plates; xylem fibres. Wood: ring porous; diffuse porous; tyloses; hear Phloem: Sieve tubes-sieve plates; companion ce Epidermal system: cell types, stomata types; tricand glandular Root: monocot, dicot, secondary growth. Stem: monocot, dicot - primary and secondary glenticels. Leaf: isobilateral, dorsiventral, C4 leaves (Kranti. Adaptive Anatomy: xerophytes, hydrophytes. Secretory tissues: cavities, lithocysts and laticing 	ements; thickenings; t- and sapwood. lls; phloem fibres. chomes: non-glandular rowth; periderm;			

Semest	er III (AY 2018-2021)	Period: t	o		
Paper:	CC6T (Economic Botany) (Theory)	Full Marks: 40	Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No. 1	Unit 1: Origin of Cultivated Plants: Concept of importance with reference to Vavilov's work. introductions; Crop domestication and loss of new crops/varieties, importance of germplasm. Unit 2: Cereals: Wheat and Rice (origin, morp management processing & uses); Brief account. Unit 3: Legumes: Origin, morphology cultivate Chick pea, Pigeon pea and fodder legumes. In ecosystem. Unit 4: Sources of sugars and starches: (Morp management and processing of sugarcane, prosugarcane industry. Potato – morphology, protunit 5: Spices: Listing of important spices, the Economic importance with special reference to black pepper. Unit 6: Beverages: Tea, Coffee (morphology, Unit 7: Sources of oils and fats: General descrextraction, their uses and health implications as soybean, mustard and coconut (Botanical namoils: General account, extraction methods, cotheir uses. Unit 8: Natural Rubber: Para-rubber: tapping, Unit 9: Drug-yielding plants: Therapeutic and special reference to Cinchona, Digitalis, Papa (Morphology, processing, uses and health haz Unit 10: Timber plants: General account with pine.	Examples of major plant genetic diversity; evolution of a diversity. phology, cultivation, and of millets. tion, management and uses of apportance to man and shology cultivation, and of moducts and by-products of apagation & uses. eir family and part used. The female, saffron, clove and processing & uses) ription, classification, groundnut, coconut, linseed, and, family & uses). Essential apparison with fatty oils & a processing and uses. It habit-forming drugs with ver and Cannabis; Tobacco cards).	(60 lectures)	Dr. Nilay Kumar Maitra	

Semest	ter III (AY 2018-2021)	Period:	to		
Paper:	CC6P (Economic Botany) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No	 Cereals: Wheat (habit sketch, L. S/T.S. grehemical tests) Rice (habit sketch, study of micro-chemical tests). Legumes: Soybean, Groundnut, (habit, frehemical tests). Sources of sugars and starches: Sugarcan micro-chemical tests), Potato (habit sketch, show localization of starch grains, w.m. startests). Spices: Black pepper, Fennel and Clove (5. Beverages: Tea (plant specimen, tea leave beans). Sources of oils and fats: Coconut- T.S. nu seeds; tests for fats in crushed seeds. Essential oil-yielding plants: Habit sketch and Eucalyptus (specimens/photographs). Rubber: specimen, photograph/model of the products. Drug-yielding plants: Specimens of Digit 10. Tobacco: specimen and products of Tob 11. Woods: Tectona, Pinus: Specimen, Sect 12. Fiber-yielding plants: Cotton (specimen lint and fuzz; whole mount of fiber and test transverse section of stem, test for lignin on fiber). 	paddy and grain, starch grain ruit, seed structure, micro- le (habit sketch; cane juice- tuber morphology, T.S. tuber rch grains, micro-chemical (habit and sections). les), Coffee (plant specimen, lut, Mustard-plant specimen, lut, Mustard-plant specimen, lut, Mustard-plant specimen, lut, amples of rubber talis, Papaver and Cannabis. lacco. lion of young stem. la, whole mount of seed to sho for cellulose), Jute (specime	m (24 lectures)	Dr. Nilay Kumar Maitra	

Semes	ster III (AY 2018-2021)	Period:	to		
Paper	: CC7T (Genetics) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance.		(16 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Extrachromosomal Inheritance Chloroplas Four o'clock plant; Mitochondrial mutations in ye coiling in snail; Infective heredity- Kappa particle	east; Maternal effects-shell	(6 lectures)	SkMd Ismail Al Amin	

3	Unit 3: Linkage, crossing over and chromosome mapping Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.	(12 lectures)	SkMd Ismail Al Amin
4	Unit 4: Variation in chromosome number and structure Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy	(8 lectures)	SkMd Ismail Al Amin
5	Unit 5: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation.DNA repair mechanisms.	(6 lectures)	SkMd Ismail Al Amin
6	Unit 6: Fine structure of gene Classical vs molecular concepts of gene; Cis- Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.	(6 lectures)	SkMd Ismail Al Amin
7	Unit 6. Population and Evolutionary Genetics Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	(6 lectures)	SkMd Ismail Al Amin

Semes	Semester III (AY 2018-2021) Period:		to		
Paper	: CC7P (Genetics) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	1. Demonstration on pretreatment, fixation squash and smear preparation.	on, staining and	(40 lectures)	SkMd Ismail Al Amin	
2	2. Study of Mitosis from Onion / Garlic /	Lentil root.		SkMd Ismail Al Amin	
3	3. Study of Meiosis with pollen mother c Solanum / Datura by smear preparation.	ell (PMC) of Onion /		SkMd Ismail Al Amin	
4	4. Mendel's laws through seed ratios. Lal probability and chi-square.	boratory exercises in		SkMd Ismail Al Amin	
5	5. Chromosome mapping using point test	cross data.		SkMd Ismail Al Amin	
6	6. Pedigree analysis for dominant and recessex linked traits	essive autosomal and		SkMd Ismail Al Amin	
7	7. Incomplete dominance and gene interaratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4			SkMd Ismail Al Amin	
8	8. Blood Typing: groups & Rh factor.			SkMd Ismail Al Amin	

9	9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	SkMd Ismail Al Amin	
10	10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.	SkMd Ismail Al Amin	
11	11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe	SkMd Ismail Al Amin	

Semes	ster III (AY 2018-2021)	Period:	to		
Paper:	SEC1T (Biofertilizers) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: General account about the microbes un Rhizobium – isolation, identification, mass must based inoculants, Actinorrhizal symbiosis.		(4 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Azospirillum: isolation and mass mul based inoculant, associative effect of differen microorganisms. Azotobacter: classification, or response to Azotobacter inoculum, maintenar multiplication.	t characteristics – crop	(8 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Cyanobacteria (blue green algae), Aza azollae association, nitrogen fixation, factors green algae and Azolla in rice cultivation.		(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Mycorrhizal association, types of mycorrange and distribution, phosp and yield – colonization of VAM – isolation production of VAM, and its influence on grouplants.	ohorus nutrition, growth and inoculum	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Organic farming – Green manuring at Recycling of biodegradable municipal, agricu wastes – biocompost making methods, types vermicomposting – field Application.	ıltural and Industrial	(6 lectures)	Dr. Nilay Kumar Maitra	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Bottiny Honours, CBCS)						
Semes	ster IV (AY 2018-2021)	Period:	to			
Paper:	CC8T (Molecular Biology) (Theory)	Credi	t:			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	Unit- 1: Nucleic acids: Carriers of genetic information Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey		(60	SkMd Ismail		

	& Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.	lectures)	Al Amin	
2	Unit -2. The Structures of DNA and RNA / Genetic Material DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA-Prokaryotes, Viruses, Eukaryotes.RNA Structure-Organelle DNA mitochondria and chloroplast DNA.TheNucleosomeChromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.			
3	Unit- 2:The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.			
4	Unit- 3: Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)			
5	Unit 4: Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes:transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.	(60 lectures)	Susanta Kumar Maity	
6	Unit 5: Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.			
7	Unit 6: Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNAsynthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.			

Semes	ster IV (AY 2018-2021)	Period:	to		
Paper	: CC8P (Molecular Biology) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Preparation of LB medium and raising E.Coli. Isolation of genomic DNA from <i>E.Coli</i> .		(30 lectures)	lectures) Ismail Al Amin	
	DNA isolation from cauliflower head. 4. DNA estimation by diphenylamine reagent/UV Spectrophotometry.			&	
	5. Study of DNA replication mechanisms through circle, Theta replication and semi-discontinuous r	n photographs (Rolling		Susanta Kumar Maity	
	6. Study of structures of prokaryotic RNA polymorpolymerase II through photographs	erase and eukaryotic RNA			
	7. Photographs establishing nucleic acid as geneti Stahl's, Avery et al, Griffith's, Hershey & Chase' experiments)	`			
	8. Study of the following through photographs: A	ssembly of Spliceosome			

·	machinery; Splicing mechanism in group I & group II introns; Ribozyme and		
	Alternative splicing.		

Semes	ster IV (AY 2018-2021)	Period:	to		
-	CC9T (Plant Ecology and geography) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction Basic concepts; Levels of organization. Inter-relationships between the living world and the environment, the components and dynamism, homeostasis.		(60 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Soil Importance; Origin; Formation Physical; Chemical and Biological composition of climate in soil development.	•		Dr. Nilay Kumar Maitra	
3	Unit 3: Water Importance: States of water Atmospheric moisture; Precipitation type hail, dew); Hydrological Cycle; Water in	s (rain, fog, snow,		Dr. Nilay Kumar Maitra	
4	Unit 4: Light, temperature, wind and fire adaptations of plants to their variation.	Variations;		Dr. Nilay Kumar Maitra	
5	Unit 5: Ecosystems Structure; Processes; organisation; Food chains and Food webs pyramids.	-		Dr. Nilay Kumar Maitra	
6	Unit 6: Population ecology Characteristic .Ecological Speciation	s and Dynamics		Dr. Nilay Kumar Maitra	
7	Unit 7: Plant communities Concept of ecc Habitat and niche; Characters: analytical Ecotone and edge effect; Dynamics: succ types; climax concepts.	and synthetic;		Dr. Nilay Kumar Maitra	
8	Unit 8: Biotic interactions Trophic organi of energy, autotrophy, heterotrophy; symcommensalism, parasitism; food chains a pyramids; biomass, standing crop.	biosis,		Dr. Nilay Kumar Maitra	
9	Unit 9: Functional aspects of ecosystem I of energy flow; Production and productive efficiencies; Biogeochemical cycles; Cyc	ity; Ecological		Dr. Nilay Kumar Maitra	

Nitrogen and Phosphorus.		
Unit 10: Phytogeography Principles; Continental drift; Theory of tolerance; Endemism; Brief description of major terrestrial biomes (one each from tropical, temperate & tundra); Phytogeographical division of India; Local Vegetation.	Dr. Nilay Kum Mait	ar

Semes	ster IV (AY 2018-2021)	Period:	to		
-	: CC9P (Plant Ecology and geography) (Practical)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure variables: Soil thermometer, maximu thermometer, anemometer, psychromical gauge and lux meter.	m and minimum	(36 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH of various soi meter, universal indicator/Lovibond of			Dr. Nilay Kumar Maitra	
3	3. Analysis for carbonates, chlorides, organic matter and base deficiency from	•		Dr. Nilay Kumar Maitra	
4	4. two soil samples by rapid field test	s.		Dr. Nilay Kumar Maitra	
5	5. Determination of organic matter of Walkley& Black rapid titration	f different soil samples by		Dr. Nilay Kumar Maitra	
6	6. method			Dr. Nilay Kumar Maitra	
7	7. Comparison of bulk density, porosi of water in soils of three habitats.	ity and rate of infiltration		Dr. Nilay Kumar Maitra	
8	8. Determination of dissolved oxygen polluted and unpolluted sources.	of water samples from		Dr. Nilay Kumar Maitra	
9	9. (a). Study of morphological adapta xerophytes (four each). (b). Study of following: Stem parasite (Cuscuta), R Epiphytes, Predation (Insectivorous p	biotic interactions of the Root parasite (Orobanche)		Dr. Nilay Kumar Maitra	
10	10. Determination of minimal quadra herbaceous vegetation in the college curve method (species to be listed).			Dr. Nilay Kumar Maitra	
11	11. Quantitative analysis of herbaceor college campus for frequency and cor Raunkiaer's frequency distribution la	mparison with		Dr. Nilay Kumar Maitra	

12	12. Quantitative analysis of herbaceous vegetation for density and abundance in the college campus. 13. Field visit to	Dr. Nilay Kumar
	familiarise students with ecology of different sites.	Maitra

Semes	ster IV (AY 2018-2021)	Period:	to		
Paper	: CC10T (Plant Systematics) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Significance of Plant systematics Int Plant identification, Classification, Nomence palynology, cytology, phytochemistry and n inventory; Functions of Herbarium; Importa gardens of the world and India; Virtual herb Documentation: Flora, Monographs, Journal and Multi-access.	lature. Evidences from nolecular data. Field nt herbaria and botanical arium; E-flora;	(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Taxonomic hierarchy Concept of tax species); Categories and taxonomic hierarch (taxonomic, biological, evolutionary).			Susanta Kumar Maity	
3	Unit 3: Botanical nomenclature Principles and names; Typification, author citation, valof names, principle of priority and its limitate	id publication, rejection		Susanta Kumar Maity	
4	Unit 4: Systems of classification Major cont Theophrastus, Bauhin, Tournefort, Linnaeus Bessey, Hutchinson, Takhtajan and Cronqui systems of Bentham and Hooker (upto series (upto series); Brief reference of Angiosperm (APG III) classification.	s, Adanson, de Candolle, st; Classification s) and Engler and Prantl		Susanta Kumar Maity	
5	Unit 5: Biometrics, numerical taxonomy and Variations; OTUs, character weighting and of Phenograms, cladograms (definitions and di	coding; Cluster analysis;		Susanta Kumar Maity	
6	Unit 6: Phylogeny of Angiosperms Terms as and advanced, homology and analogy, paral monophyly, Paraphyly, polyphyly and clade of angiosperms; Co-evolution of angiospern of illustrating evolutionary relationship (phy cladogram).	lelism and convergence, es). Origin and evolution as and animals; Methods		Susanta Kumar Maity	

Semes	ster IV (AY 2018-2021)	Period:	to		
Paper: CC10P (Plant Systematics) (Practical) Full Marks:		Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of vegetative and floral characters of the following		(36	Susanta Kumar	

2 2. Field visit (local) – Subject to grant of funds from the university. 3 3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book). Susanta Kumar Maity Susanta Kumar Maity		families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): 1. Ranunculaceae - Ranunculus, Delphinium. 2. Brassicaceae - Brassica, Alyssum / Iberis. 3. Malvaceae - Sida Sp. Urenalobota. 4. Myrtaceae - Eucalyptus, Callistemon 5. Umbelliferae - Coriandrum /Anethum / Foeniculum. 6. Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax. 7. Solanaceae - Solanum nigrum/Withania, Nicotina, Plumbaginefolia. 8. Lamiaceae - Salvia/Ocimum. 9. Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha. 10. Fasaceae - TephrosiaSp.,Crotalaria Sp., 11. Caesalpineaeceae - Cassia Sp., 12. Asclepiadaeceae- PesgulariaGygnema, 13. Apocynaceae - Hollorhen, Catharanthus. 14. Rubiaceae - Oldenladeae, Spermoeoceae, 15. Liliaceae - Asphodelus/Lilium/Allium.	lectures)	Maity	
university. Kumar Maity 3		16. Poaceae - Triticum/Hordeum/Avena.			
wild plant with herbarium label (to be submitted in the record	2	, , , ,		Kumar	
	3	wild plant with herbarium label (to be submitted in the record		Kumar	

Semes	ster IV (AY 2018-2021)	Period:	to		
Paper: SEC2T (Mushroom CultureTechnology) (Theory)		Full Marks: 40	Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove,			Dr.Nilay Kumar	

	sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	Maitra	
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra	
4	Unit 4: Food Preparation: Types of foods prepared from mushroom. Research Centres - National level and Regional level. Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra	

Curriculum Plan (Botany Honours; CBCS)

	Curriculum Plan (l	Botany Honours; CBC	S)		
Semes	ster V (AY 2018-2021)	Period:	to		
	Paper: CC11T (Reproductive Biology of Angiosperms) (Theory) Full Marks: 40		Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction :History (contributions of C E. Strasburger, S.G. Nawaschin, P. Maheshwari, Heslop-Harrison) and scope.		(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Reproductive development :Induction of modified determinate shoot. Flower development aspects.			Susanta Kumar Maity	
3	Unit 3: Anther and pollen biology Anther wall: Structure and functions, microsporo and its significance. Microgametogenesis; Pollen germ unit) structure, NPC system; Palynology an Pollen wall proteins; Pollen viability, storage and features: Pseudomonads, polyads, massulae, polli	wall structure, MGU (male d scope (a brief account); germination; Abnormal		Susanta Kumar Maity	
4	Unit 4: Ovule Structure; Types; Special structures—endothelium, and hypostase; Female Gametophyte—megaspore bisporic and tetrasporic) and megagametogenesis Polygonumtype); Organization and ultrastructure	obturator, aril, caruncle ogenesis (monosporic, (details of		Susanta Kumar Maity	
5	Unit 5: Pollination and fertilization Pollination types and significance; adaptations; str path of pollen tube in pistil; double fertilization.	-		Susanta Kumar Maity	
6	Unit 6: Self incompatibility Basic concepts (interspecific, intraspecific, homorous GSI and SSI); Methods to overcome self-incompoud pollination, stub pollination; Intra-ovarian and Modification of stigma surface, parasexual hybrid fertilization.	atibility: mixed pollination, d in vitro pollination;		Susanta Kumar Maity	
7	Unit 7: Embryo, Endosperm and Seed Structure and types; General pattern of developme embryo and endosperm; Suspensor: structure and endosperm relationship; Nutrition of embryo; Unidevelopment in <i>Paeonia</i> . Seed structure, important mechanisms	functions; Embryo- usual features; Embryo		Susanta Kumar Maity	
8	Units 7: Polyembryony and apomixis Introduction; Classification; Causes and appl	lications.		Susanta Kumar Maity	

Semes	ster V (AY 2018-2021)	Period:	to		
_	Paper: CC11P (Reproductive Biology of Angiosperms) (Practical) Full Marks: 20		Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Anther: Wall and its ontogeny; Taglandular); MMC, spore tetrads, uninucleate anther stages through slides/micrographs, running photographs and schematic represent	e, bicelled and dehisced nale germ unit (MGU)	(40 lectures)	Susanta Kumar Maity	
2	2. Pollen grains: Fresh and acetolyzed show aperture, psuedomonads, polyads, pollinia (material), ultrastructure of pollen wall(micro Tetrazolium test.germination: Calculation of in different media using hanging drop method	wing ornamentation and slides/photographs,fresh graph); Pollen viability: percentage germination		Susanta Kumar Maity	
3	3. Ovule: Types-anatropous amphitropous/campylotropous, circinotropous Tenuinucellate and crassinucellate; Special s obturator, hypostase, caruncle and slides/specimens/photographs).	s, unitegmic, bitegmic; structures: Endothelium,		Susanta Kumar Maity	
4	4. Female gametophyte through permanent sli Types, ultrastructure of mature egg apparatus			Susanta Kumar Maity	
5	5. Intra-ovarian pollination; Test tube photographs.	e pollination through		Susanta Kumar Maity	
6	6. Endosperm: Dissections of developing se free-nuclear haustoria.	eds for endosperm with		Susanta Kumar Maity	
7	7. Embryogenesis: Study of development of permanent slides; dissection of developing various developmental stages; Study of susmicrographs	seeds for embryos at		Susanta Kumar Maity	

Semes	ster V (AY 2018-2021)	Period:	to		
Paper: CC12T (Plant Physiology) (Theory)		Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
2	Unit 1: Plant-water relations Water Potential and its components, water aquaporins, pathway of water movement transmembrane pathways, root pressure, gual cohesion-tension theory. Transpiration a transpiration, antitranspirants, mechanism of the Unit 2: Mineral nutrition Essential and beneficial elements, macro and of study and use of nutrient solutions, criterial deficiency symptoms, roles of essential elements.	nt, symplast, apoplast, ttation. Ascent of sap – nd factors affecting stomatal movement. micronutrients, methods a for essentiality, mineral	(60 lectures)	Dr.Nilay Kumar Maitra Dr.Nilay Kumar Maitra	

3	Unit 3: Nutrient Uptake	Dr.Nilay
	Soil as a nutrient reservoir, transport of ions across cell membrane,	Kumar
	passive absorption, electrochemical gradient, facilitated diffusion,	Maitra
	active absorption, role of ATP, carrier systems, proton ATPase pump	
	and ion flux, uniport, co-transport, symport, antiport.	
4	Unit 4: Translocation in the phloem	Dr.Nilay
	Experimental evidence in support of phloem as the site of sugar	Kumar
	translocation. Pressure–Flow Model; Phloem loading and unloading;	Maitra
	Source–sink relationship.	
5	Unit 5: Plant growth regulators	Dr.Nilay
	Discovery, chemical nature (basic structure), bioassay and	Kumar
	physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid,	Maitra
	Ethylene, Brassinosteroids and Jasmonic acid.	
6	Unit 6: Physiology of flowering	Dr.Nilay
	Photoperiodism, flowering stimulus, florigen concept, vernalization,	Kumar
	seed dormancy.	Maitra
7	Unit 7: Phytochrome, crytochromes and phototropins	Dr.Nilay
	Discovery, chemical nature, role in photomorphogenesis, low energy	Kumar
	responses (LER) and high irradiance responses (HIR), mode of	Maitra
	action.	
	action.	
	<u> </u>	

Semester V (AY 2018-2021) Period:		to			
Paper:	Paper: CC12P (Plant Physiology) (Practical) Full Marks: 20		Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determination of osmotic potential of plant c method.	ell sap by plasmolytic	(40 lectures)	Dr.Nilay Kumar Maitra	
2	Determination of water potential of given weight method.	tissue (potato tuber) by		Dr.Nilay Kumar Maitra	
3	Study of the effect of wind velocity an transpiration in excised twig/leaf.	d light on the rate of		Dr.Nilay Kumar Maitra	
4	Calculation of stomatal index and stomatal surfaces of leaves of a mesophyte and xerophyte			Dr.Nilay Kumar Maitra	
5	To calculate the area of an open stoma and percentage of leaf area open through stomata in a mesophyte and xerophyte (both surfaces).			Dr.Nilay Kumar Maitra	
6	To study the phenomenon of seed germination	on (effect of light).		Dr.Nilay Kumar Maitra	
7	To study the effect of different concentrations of IAA on <i>Avena</i> coleoptile elongation (IAA Bioassay).			Dr.Nilay Kumar Maitra	
8 To study the induction of amylase activity grains.		y in germinating barley		Dr.Nilay Kumar Maitra	
	Demonstration experiments				
	1. To demonstrate suction due to transp	viration.		Dr.Nilay Kumar Maitra	

2. Fruit ripening/Rooting from cuttings (Demonstration).	Dr.Nilay Kumar Maitra
3. Bolting experiment/Avenacoleptile bioassay (demonstration).	Dr.Nilay Kumar Maitra

Semester V (AY 2018-2021) Period:		Period:	to		
Paper:	Paper: DSE1 (Biostatistics) (Theory) Full Man		Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biostatistics Definition - statistical methods - basic - measurements, functions, limitations a		(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Collection of data primary and secondary Types and methods of data collection procedures - merits and demerits. Classification - tabulation and presentation of data - sampling methods.			Dr.Nilay Kumar Maitra	
3	Unit 3:Measures of central tendency Mean, median, mode, geometric mean Measures of dispersion - range, stand deviation, quartile deviation - merits efficient of variations.	lard deviation, mean		Dr.Nilay Kumar Maitra	
4	Unit 4: Correlation Types and methods of correlation, regression equation, fitting prediction dissimilarities of correlation and regression.	on, similarities and		Dr.Nilay Kumar Maitra	
5	Unit 5: Statistical inference Hypothesis - simple hypothesis - studentest.			Dr.Nilay Kumar Maitra	

Semes	ster V (AY 2018-2021)	Period:	to		
Paper	: DSE 1P (Biostatistics) (Practical)	Full Marks: 20	Cr	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Calculation of mean, standard deviation and standard error		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Calculation of correlation coefficient version the probability	values and finding out		Dr.Nilay Kumar Maitra	
3	Calculation of 'F' value and finding value for the F value.	g out the probability		Dr.Nilay Kumar Maitra	

Semes	ster V (AY 2018-2021)	Period:	to		
Paper:	DSE2 (Plant Breeding) (Theory)	Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant Breeding Introduction and objectives. Breeding reproduction in crop plants. Important undesirable consequences of plant breed	nt achievements and	(8 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Methods of crop improvement Introduction: Centres of origin and deplants, plant genetic resources; Acclimethods: For self pollinated, crop vegetatively propagated plants; Hybrocross and vegetatively propagated advantages and limitations.	omestication of crop matization; Selection oss pollinated and ridization: For self,	(8 lectures)	Susanta Kumar Maity	
3	Unit 3: Quantitative inheritance Concept, mechanism, examples of in colour in wheat, Skin colour in human polygenic Inheritance.		(8 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Inbreeding depression and he History, genetic basis of inbreeding heterosis; Applications.		(8 lectures)	Susanta Kumar Maity	
5	Unit 5: Crop improvement and breed Role of mutations; Polyploidy; Distant role of biotechnology in crop improvem	hybridization and	(8 lectures)	SkMd Ismail Al Amin	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	ster VI (AY 2018-2021)	Period:	to		
Paper: CC13T (Plant Metabolism) (Theory) Full Marks:		Cred	it:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Concept of metabolism Introduc catabolic pathways, regulation of metaboregulatory enzymes (allosteric ,covalent Isozymes).	olism, role of	(60 lectures)	Dr.Nilay Kumar Maitra	

Unit 2: Carbon assimilation Historical background,		
photosynthetic pigments, role of photosynthetic pigments		
(chlorophylls and accessory pigments), antenna molecules and		
reaction centres, photochemical reactions, photosynthetic		
electron transport, PSI, PSII, Q cycle, CO2 reduction,		
photorespiration, C4 pathways; Crassulacean acid metabolism;		
Factors affecting CO2 reduction.		
Unit 3: Carbohydrate metabolism Synthesis and catabolism of sucrose and starch.		
Heit A. Code of Oridation Characteristic fits of commute		
Unit 4: Carbon Oxidation Glycolysis, fate of pyruvate,		
regulation of glycolysis, oxidative pentose phosphate pathway,		
oxidative decarboxylation of pyruvate, regulation of PDH, NADH shuttle; TCA cycle,amphibolic role, anaplerotic		
reactions, regulation of the cycle, mitochondrial electron		
transport, oxidative phosphorylation, cyanide-resistant		
respiration, factors affecting respiration.		
Unit 5: ATP-Synthesis Mechanism of ATP synthesis, substrate		
level phosphorylation, chemiosmotic mechanism (oxidative		
and photophosphorylation), ATP synthase, Boyers		
conformational model, Racker's experiment, Jagendorf's		
experiment; role of uncouplers.		
Unit 6: Lipid metabolism Synthesis and breakdown of		
triglycerides, β-oxidation, glyoxylate cycle, gluconeogenesis		
and its role in mobilisation of lipids during seed germination, $\boldsymbol{\alpha}$		
oxidation		
Unit 7: Nitrogen metabolism Nitrate assimilation, biological		
nitrogen fixation (examples of legumes and non-legumes);		
Physiology and biochemistry of nitrogen fixation; Ammonia		
assimilation and transamination.		
Unit 8: Mechanisms of signal transduction Receptor-ligand		
interactions; Second messenger concept, Calcium calmodulin,		
MAP kinase cascade		

Semes	ster VI (AY 2018-2021)	Period:	to		
Paper: CC13P Plant Metabolism (Practical)		Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Chemical separation of photosynthetic pigments. Experimental demonstration of Hill's reaction.		(35 lectures)	Dr.Nilay Kumar Maitra	
	3. To study the effect of light intensity o photosynthesis.	n the rate of			

4. Effect of carbon dioxide on the rate of photosynthesis.		
5. To compare the rate of respiration in different parts of a plant.		
6. To demonstrate activity of Nitrate reductase in germinating leaves of different plant sources.		
7. To study the activity of lipases in germinating oilseeds and demonstrate mobilization of lipids 1. during germination.		
8. Demonstration of fluorescence by isolated chlorophyll pigments.		
9. Demonstration of absorption spectrum of photosynthetic pigments		

Semester VI (AY 2018-2021)		Period:	to		
Paper:	CC14T (Plant Biotechnology) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit -1: Plant Tissue Culture Historical perspective Nutrient and hormone requirements (role of vitami Totipotency; Organogenesis; Embryogenesis (some Protoplast isolation, culture and fusion; Tissue cult (micropropagation, androgenesis, virus elimination production, haploids, triploids and hybrids; Cryoper Conservation). Unit- 2: Recombinant DNA technology Restriction Types I-IV, biological role and application); Unit - 5: Applications of Biotechnology Pest resistant plants (RoundUp Ready soybean); Transg quality traits (Flavr Savr tomato, Golden rice); Improvarieties (Moondust carnations); Role of transgenic (Superbug); edible vaccines; Industrial enzymes (A Lipase); Gentically Engineered Products—Human C Humulin; Biosafety concerns.	ns and hormones); atic and zygotic); ure applications a, secondary metabolite eservation; Germplasm n Endonucleases (History, ant (Bt-cotton); herbicide enic crops with improved proved horticultural es in bioremediation aspergillase, Protease,	(30 lectures)	Susanta Kumar Maity	
2	Unit- 2: Restriction Mapping (Linear and Circular) Prokaryotic (pUC 18 and pUC19, pBR322, Ti plas phage, M13 phagemid, Cosmid, Shuttle vector; Eu Unit- 3:Gene Cloning Recombinant DNA, Bacteria selection of recombinant clones, PCRmediated gen construction of genomic and cDNA libraries, scree obtain gene of interest by genetic selection; comple hybridization; PCR Unit- 4: Methods of gene transfer Agrobacterium-r transfer by Electroporation, Microinjection, Microj Selection of transgenics—selectable marker and reg GUS, GFP).	mid, BAC); Lambda karyotic Vectors (YAC). al Transformation and the cloning; Gene Construct; ming DNA libraries to ementation, colony mediated, Direct gene projectile bombardment;	(30 lectures)	SkMd Ismail Al Amin	

Semester V (AY 2018-2021)		Period:	to			
Paper	Paper: CC14P () (Practical)		C14P () (Practical) Full Marks:		it:	
Sl. No.		TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	sterilization and tobacco, Datura 2. Study of antl	n, Brassica etc. ner, embryo and endospern ogenesis & artificial seeds	g leaf and nodal explants of n culture, micropropagation	lectures)	Susanta Kumar Maity	
2	the data provid 5. Study of met Agrobacterium 6. transfer by e bombardment. 7. Study of step Golden rice, Fl 8. Isolation of	chods of gene transfer throughout the chods of gene transfer through place. The chods of genetic engineering for avr Savr tomato through place.	agh photographs: tion, microprojectile or production of Bt cotton, hotographs.	(16 lectures)	SkMd Ismail Al Amin	

Seme	ster VI (AY 2018-2021)	Period:	to		
Paper: DSE3 (Industrial and Environmental Microbiology) (Theory)		Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Scope of microbes in industry and enviror Unit 2: Bioreactors/Fermenters and fermentation liquid-state (stationary and submerged) fermentat fermentations. Components of a typical bioreactor bioreactorslaboratory, pilotscale and production for stirred tank fermenter, tower fermenter, fixed bed bioreactors and air-lift fermenter. A visit to any en- to see an industrial fermenter, and other downstree Unit 3: Microbial production of industrial product media, fermentation conditions, downstream proc centrifugation, cell disruption, solvent extraction, ultrafiltration, lyophilization, spray drying; Hands for the production and estimation (qualitative and amylase or lipase activity, Organic acid (citric aci (Ethanol) and antibiotic (Penicillin)	processes Solid-state and tons; Batch and continuous c, Types of ermenters; Constantly and fluidized bed ducational institute/ industry am processing operations. s Microorganisms involved, essing and uses; Filtration, precipitation and on microbial fermentations quantitative) of Enzyme:	(50 lectures)	SkMd Ismail Al Amin & & Susanta Kumar Maity	
	Unit 4: Microbial enzymes of industrial interest a	nd enzyme immobilization			

Microorganisms for industrial applications_and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).	
Unit 5: Microbes and quality of environment. Distribution of microbes in air; Isolation of microorganisms from soil, air and water.	
Unit 6: Microbial flora of water. Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples.	
Unit 7: Microbes in agriculture and remediation of contaminated soils. Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.	

Cred	lit:	
CLASSES		
ALLOTED	Class taken by	Remark
(30 lectures)	SkMd Ismail Al Amin & Susanta Kumar	
1	ure	ure & Susanta

Semester VI (AY 2018-2021)		Period:	to		
-	: DSE4 (Analytical Techniques in Plant ces) (Theory) TOPICS	Full Marks:	CLASSES ALLOTED	Class	Remark
1	Unit- 1: Imaging and related techniques I microscopy; Light microscopy; Fluoresce Confocal microscopy; Use of fluorochror cytometry (FACS); (b) Applications of fl microscopy: Chromosome banding, FISH painting; Transmission and Scanning electron microscopy electron for electron microscopy etching. Unit- 2: Cell fractionation Centrifugation	ence microscopy; mes: (a) Flow uorescence I, chromosome etron microscopy – py, cryofixation, fracture, freeze	(50 lectures)	SkMd Ismail Al Amin & Susanta Kumar Maity	

	,	
density gradient centrifugation, sucrose density gradient,		
CsCl2gradient, analytical centrifugation, ultracentrifugation, marker enzymes.		
Unit- 3: Radioisotopes Use in biological research, auto-		
radiography, pulse chase experiment.		
Unit- 4: Spectrophotometry Principle and its application in		
biological research.		
Unit- 5: Chromatography Principle; Paper chromatography;		
Column chromatography, TLC, GLC, HPLC, Ionexchange		
chromatography; Molecular sieve chromatography; Affinity		
chromatography.		
Unit- 6: Characterization of proteins and nucleic acids Mass		
spectrometry; X-ray diffraction; X-ray crystallography;		
Characterization of proteins and nucleic acids; Electrophoresis:		
AGE, PAGE, SDS-PAGE		
Unit- 7: Biostatistics Statistics, data, population, samples,		
parameters; Representation of Data: Tabular, Graphical;		
Measures of central tendency: Arithmetic mean, mode, median;		
Measures of dispersion: Range, mean deviation, variation,		
standard deviation; Chi-square test for goodness of fit.		

Semester VI (AY 2018-2021)		Period: to			
Paper: DSE4 (Analytical Techniques in Plant Sciences) (Practical)		Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	, ,	dy of Blotting techniques: Southern, Northern and Western, DNA gerprinting, DNA sequencing, PCR through photographs. Demonstration of ELISA.		SkMd Ismail Al Amin	
	3. To separate nitrogenous bases by paper chromatography.			&	
	4. To separate sugars by thin layer chromatography.				
	Isolation of chloroplasts by differential cer To separate chloroplast pigments by colum		Susanta Kumar Maity		
	7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE.				
	9. To separation DNA (marker) using AGE.				
	10. Study of different microscopic techniques photographs/micrographs (freeze fracture, fre staining, positive staining, fluorescence and F				
	11. Preparation of permanent slides (double staining)				

Curriculum Plan (ODD SEMESTER) (Botany Honours; CBCS)

Semes	ster I (AY 2017-2020)	Period:	to		
Paper:	CC 1T(Phycology and Microbiology) (Theory)	Full Marks: 40+15	C	Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to microbial world growth and metabolism. Economic importance to vaccine production, role in a diagnostics, as causal organisms of plai importance of bacteria with reference to their industry (fermentation and medicine).	rtance of viruses with research, medicine and nt diseases. Economic r role in agriculture and	(7 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Viruses Discovery, physioche characteristics; classification (Baltimore), special reference to viroids and prions; replic DNA virus (T-phage), lytic and lysogenic cycles.	general structure with cation (general account), cle; RNA virus (TMV).	(7 lectures	SkMd Ismail Al Amin	
3	Unit 3: Bacteria Discovery, general archaebacteria, eubacteria, wall-less for spheroplasts); Cell structure; Nutritional vegetative, asexual and recombination (con and transduction).	ns (mycoplasma and types; Reproduction-	(7 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Algae General characteristics; Ecrange of thallus organization; Cell structure wall, pigment system, reserve food (of only gasyllabus), flagella; methods of reproduction; system of Fritsch, and evolutionary classific groups) and Van – den Hoek et.al(1982); Sig important phycologists (F.E. Fritsch, G.M. Structure), Desikachary, H.D. Kumar, M.O.P. Iyengar environment, agriculture, biotechnology and structure.	e and components; cell groups represented in the g Classification; criteria, ation of Lee (only upto nificant contributions of Smith, R.N. Singh, T.V.). Role of algae in the	(11 lectures)	Susanta Kumar Maity	
5	Unit 5: Cyanophyta and Xanthophyta Ec Range of thallus organization; Cell st Morphology and life-cycle of Nostoc and Van	ructure; Reproduction, ucheria.	(8 lectures)	Susanta Kumar Maity	
6	Unit 6: Chlorophyta and Charophyta Occurrence; Range of thallus organiz Reproduction. Morphology and life-cycle Volvox, Oedogonium, Coleochaete, Chara. E of Prochloron.	ation; Cell structure; s of <i>Chlamydomonas</i> , volutionary significance	(8 lectures)	Susanta Kumar Maity	
7	Unit 7: Phaeophyta and Rhodophyta: Char Range of thallus organization; Cell st Morphology and life-cycles of <i>Ectocarpus</i> , F	ructure; Reproduction.	(12 lectures)	Susanta Kumar Maity	

Semes	ster I (AY 2017-2020)	Period:		to		
Paper: CC 1P (Phycology and Microbiology) Full Marks: 20 (Practical)		20	Cr	redit:02		
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark

1	Microbiology 1. Electron micrographs/Models of viruses – T-Phage and TMV, Line drawings/ Photographs of Lytic and Lysogenic Cycle. 2. Types of Bacteria to be observed from temporary/permanent slides/photographs. Electron micrographs of bacteria, binary fission, endospore, conjugation, root Nodule. 3. Gram staining. 4. Endospore staining with malachite green using the (endospores taken from soil bacteria). 5. Study of bacteria from root nodules/Curd sample.	20	SkMd Ismail Al Amin	
2	Phycology Study of vegetative and reproductive structures of Nostoc, <i>Chlamydomonas</i> (electron micrographs), Volvox, <i>Oedogonium, Coleochaete, Chara, Vaucheria, Ectocarpus, Fucus</i> and <i>Polysiphonia, Procholoron</i> through electron micrographs, temporary preparations and permanent slides.	20	Susanta Kumar Maity	

Seme	ster I (AY 2017-2020)	Period:	to		
-	e: CC 2T (Biomolecules and Cell gy) (Theory)	Full Marks: 40+15		Credit:04	
Sl. No.	TOPICS	I	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biomolecules: Types and significations of water; pH and Carbohydrates: Nomenclature and class Monosaccharides; Disaccharides; Oligon polysaccharides. Lipids: Definition and and structural lipids; Fatty acids structural Essential fatty acids; Triacylglycerols structure; Phosphoglycerides. Proteins acids; Levels of protein structure-primary and quarternary; Protein denaturation are proteins. Nucleic acids: Structure of nitrand function of nucleotides; Types of RNA; Structures of DNA; Types of RNA; Structures and RNA; Structures of DNA; Types of RNA; Structures and Structures of DNA; Types of RNA; Structures of DNA; Types of RNA; Structures and Structures of DNA; Types of RNA; Structures of DNA; Types of RNA; Structures and Structures of DNA; Types of RNA; Structures of DNA; S	and buffers. ification; osaccharides and major classes of storage re and functions; tructure, functions and : Structure of amino ry, secondary, tertiary and biological roles of rogenous bases; Structure ucleic acids; Structure of	(20 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Bioenergenetics : Laws of therm free energy, endergonic and exergonic reactions, redox reactions. ATP: structu currency molecule.	reactions, coupled	(4 lectures)	Dr. Nilay Kumar Maitra	
3	Unit 3: Enzymes: Structure of enzyme: cofactors, coenzymes and prosthetic greenzymes; Features of active site, substramechanism of action (activation energy induced - fit theroy), Michaelis – Mente inhibition and factors affecting enzyme	oup; Classification of ate specificity, , lock and key hypothesis, en equation, enzyme	(6 lectures)	Dr. Nilay Kumar Maitra	
4	Unit4: The cell: Cell as a unit of structu	re and function;	(4	Dr. Nilay	

	Characteristics of prokaryotic and eukaryotic cells; Origin ofeukaryotic cell (Endosymbiotic theory).	lectures)	Kumar Maitra
5	Unit 5: Cell wall and plasma membrane: Chemistry, structure and function of Plant cell wall. Overview of membrane function; fluid mosaic model; Chemical composition of membranes; Membrane transport – Passive, active and facilitated transport, endocytosis and exocytosis.	(4 lectures)	Dr. NilayKumar Maitra
6	Unit 6: Cell organelles: Nucleus: Structure-nuclear envelope, nuclear pore complex, nuclear lamina, molecular organization of chromatin; nucleolus. Cytoskeleton: Role and structure of microtubules, microfilaments and intermediary filament. Chloroplast, mitochondria and peroxisomes: Structural organization; Function; Semiautonomous nature of mitochondria and chloroplast. Endomembrane system: Endoplasmic Reticulum – Structure, targeting and insertion of proteins in the ER, protein folding, processing; Smooth ER and lipid synthesis, export ofproteins and lipids; Golgi Apparatus – organization, protein glycosylation, protein sorting and export from Golgi Apparatus; Lysosomes	(16 lectures)	Dr. Nilay Kumar Maitra
7	Unit 7: Cell division: Phases of eukaryotic cell cycle, mitosis and meiosis; Regulation of cell cycle- checkpoints, role of protein kinases.	(6 lectures)	Dr. Nilay Kumar Maitra

Semes	ster I (AY 2017-2020)	Period:	to		
-	Paper: CC 2P (: Biomolecules and Cell Biology) (Practical) Full Marks: 20		C	redit:02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Qualitative tests for carbohydrates, recreducing sugars, lipids and proteins.	lucing sugars, non-	(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Study of plant cell structure with the h mount of Onion/Rhoeo /Crinum.	he help of epidermal peel		Dr. Nilay Kumar Maitra	
3	3. Demonstration of the phenomenon of streaming in Hydrilla leaf.	protoplasmic		Dr. Nilay Kumar Maitra	
4	4. Measurement of cell size by the technic	ique of micrometry.		Dr. Nilay Kumar Maitra	
5	5. Counting the cells per unit volume with haemocytometer. (Yeast/pollen grains).	th the help of		Dr. Nilay Kumar Maitra	
6	6. Study of cell and its organelles with the micrographs.	e help of electron		Dr. Nilay Kumar Maitra	

7	7. Cytochemical staining of : DNA- Feulgen Actocarmin and AcetoOrcrin stain and cell wall in the epidermal peel of onion using Periodic Schiff's (PAS) staining technique.	Dr. Nilay Kumar Maitra
8	8. Study the phenomenon of plasmolysis and deplasmolysis.	Dr. NilayKumar Maitra
9	9. Study the effect of organic solvent and temperature on membrane permeability.	Dr. Nilay Kumar Maitra
10	10. Study different stages of mitosis and meiosis.	Dr. Nilay Kumar Maitra

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

Semes	ster II (AY 2017-2020)	Period:	to		
-	CC 3T (Mycology and pathology) (Theory)	Full Marks: 40	(Credit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to true fungi: General of Affinities with plants and animals; Thallus wall composition; Nutrition; Classification.	organization; Cell	(6 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Chytridiomycota and Zygomycota: features; Ecology and significance; Thallus Reproduction; Life cycle with reference to Rhizopus.	organisation;	(5 lecture)	Dr. Nilay Kumar Maitra	
3	Unit 3: Ascomycota: General characteristic fruiting bodies); Ecology; Life cycle, Heter parasexuality; Life cycle and classification Saccharomyces, Aspergillus, Penicillium, A Neurospora and Peziza.	okaryosis and with reference to	(10 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Basidiomycota: General characteris cycle and Classification with reference to b wheat Puccinia (Physiological Specialization smut (symptoms only), Agaricus; Biolumin and Mushroom Cultivation with special reference of Mashroom.	lack stem rust on on), loose and covered sescence, Fairy Rings	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Allied Fungi: General characteristic molds, Classification; Occurrence; Types o fruiting bodies.		(3 lectures)	Dr. Nilay Kumar Maitra	
6	Unit 6: Oomycota: General characteristics; and classification with reference to Phytoph		(4 lectures)	Dr. Nilay Kumar Maitra	
7	Unit 7: Symbiotic associations Lichen: – Ocharacteristics; Growth forms and range of Nature of associations of algal and fungal p Reproduction; Mycorrhiza-Ectomycorrhiza	thallus organization; partners;	(4 lectures)	Dr. Nilay Kumar Maitra	

	and their significance.		
8	Unit 8: Applied Mycology: Role of fungi in biotechnology; Application of fungi in food industry (Flavour & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Secondary metabolites (Pharmaceutical preparations); Agriculture (Biofertilizers); Mycotoxins; Biological control (Mycofungicides, Mycoherbicides, Mycoinsecticides, Myconematicides); Medical mycology.	(10 Lectures)	Dr. Nilay Kumar Maitra
9	Unit 9: Phytopathology: Terms and concepts; General symptoms; Geographical distribution of diseases; Etiology; Symptomology; Host-Pathogen relationships; Disease cycle and environmental relation; prevention and control of plant diseases, and role of quarantine.	(10 lectures)	Dr. Nilay Kumar Maitra
10	Bacterial diseases: – Citrus canker and angular leaf spot of cotton. Viral diseases – Tobacco Mosaic viruses, vein clearing. Fungal diseases – Early blight of potato, Black stem rust of wheat, White rust of crucifers.	(10 lectures)	SkMdIsmail Al Amin

Seme	ster II (AY 2017-2020)	Period:	to		
-	: CC 3P(Mycology and pathology)(Practical)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Introduction to the world of fungi (Unicella coenocytic/septate mycelium, ascocarps&basical)		(30 lectures)	Dr. Nilay Kumar Maitra	
2	2. Rhizopus: study of asexual stage from temp sexual structures through permanent slides.	porary mounts and		Dr. Nilay Kumar Maitra	
3	3. Aspergillus and Penicillium: study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs.				
4	4. Peziza: Ascobulus sectioning through asco	carp.		Dr. Nilay Kumar Maitra	
5	5. Alternaria: Specimens/photographs and ten	nporary mounts.		Dr. Nilay Kumar Maitra	
6	6. Puccinia: Herbarium specimens of Black S and infected Barberry leaves; sections/ mount and permanent slides of both the hosts.			Dr. Nilay Kumar Maitra	
7	7. Agaricus: Specimens of button stage and fu sectioning of gills of Agaricus, fairy rings and mushrooms to be shown.	-	-	Dr. Nilay Kumar Maitra	
8	8. Study of phaneroplasmodium from actual s photograph. Study of Stemonitis sporangia.	pecimens and /or		Dr. Nilay Kumar Maitra	

9	9. Albugo: Study of symptoms of plants infected with Albugo; asexual phase study through section/ temporary mounts and sexual structures through permanent slides.		Dr. Nilay Kumar Maitra	
10	10. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates. Study of thallus and reproductive structures (soredia and apothecium) through permanent slides. Mycorrhizae: ectomycorrhiza and endomycorrhiza (Photographs)		Dr. Nilay Kumar Maitra	
11	11. Phytopathology: Herbarium specimens of bacterial diseases; Citrus Canker; Angular leaf spot of cotton, Viral diseases: TMV, Vein clearing, Fungal diseases: Early blight of potato, Black stem rust of wheat and White rust of crucifers.	(10 lectures)	SkMd Ismail Al Amin	

Semester II (AY 2017-2020) Period:		Period:	to		
Paper	: CC 4T (Archegoniate) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction: Unifying features of Transition to land habit; Alternation of ge	_	(4 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Bryophytes: General characteristi land habit; Classification; Range of thallu		(6 lectures)	SkMd Ismail Al Amin	
3	Unit 3: Type Studies:- Bryophytes Classifamily), morphology, anatomy and reproduction and explanatia, Pellia, Porella, Anthoceros, Sunaria; Pogonatum, Reproduction and explication, Marchantia, Plagichasma Anthoce (developmental stages not included). Eco importance of bryophytes with special results.	duction of Riccia, Sphagnum and volutionary trends in eros and Funaria logical and economic	(12 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Pteridophytes: General characteric Early land plants (Cooksonia and Rhynia	·	(6 lectures)	Susanta Kumar Maity	
5	Unit 5: Type Studies-: Pteridophytes Class family), morphology, anatomy and reproduced Selaginella, Equisetum and Pteris (Develoto be included). Apogamy, and apospory, habit, telome theory, stelar evolution; Economic importance.	duction of Psilotum, opmental details not heterosporyandseed	(14 lectures)	Susanta Kumar Maity	
6	Unit 6: Gymnosperms: General character (up to family), morphology, anatomy and Cycas, Pinus and Gnetum (Developmenta included); Ecological and economic important	reproduction of al details not to be	(18 lectures)	Susanta Kumar Maity	

Semester II (AY 2017-2020) Period:					
Paper	Paper: CC 4P (Archegoniate) (Practical) Full Marks: 20		Cı	redit:02	
Sl. No.	TOPICS			Class taken by	Remark
1	1. Riccia – Morphology of thallus.		(15 lectures)		
2	2. Marchantia- Morphology of thallus, whole mount of rhizoids & Scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (all temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides).			SkMd Ismail Al Amin	
3	3. Anthoceros- Morphology of thallus, dissection o stomata, spores, pseudoelaters, columella) (tempora of thallus (permanent slide).			SkMd Ismail Al Amin	
4	4. Pellia, Porella- Permanent slides.			SkMd Ismail Al Amin	
5	5. Sphagnum- Morphology of plant, whole mounts only).	of leaf (permanent slide		SkMd Ismail Al Amin	
6	6. Funaria- Pogonatum/ Polytrichum Morphology, rhizoids, operculum, peristome, annulus, spores (te permanent slides showing antheridial and archegon section of capsule and protonema.	mporary slides);		SkMd Ismail Al Amin	
7	7. Psilotum- Study of specimen, transverse section slide).	of synangium (permanent	(15 lectures)	Susanta Kumar Maity	
8	8. Selaginella- Morphology, whole mount of leaf w section of stem, whole mount of strobilus, whole m and megasporophyll (temporary slides), longitudina (permanent slide).	nount of microsporophyll		Susanta Kumar Maity	
9	9. Equisetum- Morphology, transverse section of ir section of strobilus, transverse section of strobilus, sporangiophore, whole mount of spores (wet and de transverse section of rhizome (permanent slide).	whole mount of		Susanta Kumar Maity	
10	10. Pteris- Morphology, transverse section of rachis sporophyll, wholemount of sporangium, whole mous slides), transverse section of rhizome, whole mount organs and young sporophyte (permanent slide).	unt of spores (temporary		Susanta Kumar Maity	
11	11. Cycas- Morphology (coralloid roots, bulbil, lea microsporophyll, transverse section of coralloid root rachis, vertical section of leaflet, vertical section of mount of spores (temporary slides), longitudinal se section of root (permanent slide).	ot, transverse section of microsporophyll, whole		Susanta Kumar Maity	
12	12. Pinus- Morphology (long and dwarf shoots, wh male and female cones), transverse section of Need stem, longitudinal section of / transverse section of of microsporophyll, whole mount of Microspores (longitudinal section of female cone, tangential long longitudinal sections stem (permanent slide).	lle, transverse section of male cone, whole mount temporary slides),		Susanta Kumar Maity	
13	13. Gnetum- Morphology (stem, male & female co stem, vertical section of ovule (permanent slide)	nes), transverse section of		Susanta Kumar Maity	

14	14. Botanical excursion	Susanta	
		Kumar	
		Maity	

Curriculum Plan (ODD SEMESTER)
(Botany Honours: CBCS)

		ny Honours; CBCS)			
Sei	mester III (AY 2017-2020)	Period: to			
_	per: CC5T (Anatomy of Angiosperms)	Full Marks: 40	Credit:04		
Sl. N o.	TOPICS		CLASSE S ALLOTE D	Class taken by	Rema rk
1	Unit 1: Introduction and scope of Plant Ana systematics, forensics and pharmacognosy.		(4 Lectures)	Susanta Kumar Maity	
2	Unit 2: Structure and Development of Plant plant body: The three tissue systems, types of plant body: polarity, cytodifferentiation embryogenic development, Root-stem transconcept.	of cells and tissues. Development and organogenesis during	(6 Lectures)	Susanta Kumar Maity	
3	Unit 3: Tissues Classification of tissues; Siphylogeny); cytodifferentiation of tracheary Pits and plasmodesmata; Wall ingrowths an incrustation, Ergastic substances. Hydathoclaticifers.	y elements and sieve elements; nd transfer cells, adcrustation and	(12Lectur es)	Susanta Kumar Maity	
4	Unit 4: Apical meristems: Evolution of con apex (Apical cell theory, Histogen theory, meristematic residue, cytohistological zona Structure of dicot and monocot stem. Origi diversity in size and shape of leaves; Struct Kranz anatomy. Organization of root apex theory, Korper-Kappe theory); Quiescent codicot and monocot root; Endodermis, exodo	Tunica Corpus theory, continuing ation); Types of vascular bundles; n, development, arrangement and ture of dicot and monocot leaf, (Apical cell theory, Histogen entre; Root cap; Structure of	(15 Lectures)	Susanta Kumar Maity	
5	Unit 5: Vascular Cambium and Wood Structure activity of cambium; Secondary growth in secondary growth in Bignonia, Boerhaavia, Axially and radially oriented elements; Typ Cyclic aspects and reaction wood; Sapwood diffuse porous wood; Early and late wood, Development and composition of periderm	root and stem. Anomalous , Aristolochia and Dracaena. pes of rays and axial parenchyma; d and heartwood; Ring and tyloses; Dendrochronology.	(15 Lectures)	Susanta Kumar Maity	
6	Unit 6: Adaptive and Protective Systems E epicuticular waxes, trichomes(uni-and mult nonglandular, two examples of each), stom and incrustation; Anatomical adaptations of Mechanical tissue – distribution and significant	ticellular, glandular and ata (classification); Adcrustation f xerophytes and hydrophytes.	(8 Lectures)	SusantaKu mar Maity	

Semes	ster III (AY 2017-2020)	Period:	to		
Paper (Pract	: CC5P (Anatomy of Angiosperms)	Full Marks: 20		Credit:02	
Sl. No.	TOPICS	1	CLASSE S ALLOTE D	Class taken by	Remark
1	Study of anatomical details through permanent mounts/ macerations/museum specimens with the examples. Apical meristem of root, shoot and vascular can	(20 Lectur es)	Susanta Kumar Maity		
	3. Distribution and types of parenchyma, collenchy4. Xylem: Tracheary elements-tracheids, vessel elements perforation plates; xylem fibres.				
	5. Wood: ring porous; diffuse porous; tyloses; hea6. Phloem: Sieve tubes-sieve plates; companion ce7. Epidermal system: cell types, stomata types; tricand glandular				
	8. Root: monocot, dicot, secondary growth. 9. Stem: monocot, dicot - primary and secondary growth; periderm; lenticels.				
	10. Leaf: isobilateral, dorsiventral, C4 leaves (Kra 11. Adaptive Anatomy: xerophytes, hydrophytes.	nz anatomy).			
	12. Secretory tissues: cavities, lithocysts and laticifers.				

No. 1 Unit 1: Origin of Cultivated Plants: Concept of Centres of Origin, their importance with reference to Vavilov's work. Examples of major plant introductions; Crop domestication and loss of genetic diversity; evolution of new crops/varieties, importance of germplasm diversity. Unit 2: Cereals: Wheat and Rice (origin, morphology, cultivation, management processing & uses); Brief account of millets. Unit 3: Legumes: Origin, morphology cultivation, management and uses of Chick pea, Pigeon pea and fodder legumes. Importance to man and ecosystem. Unit 4: Sources of sugars and starches: (Morphology cultivation, management and processing of sugarcane, products and by-products of sugarcane industry. Potato — morphology, propagation & uses. Unit 5: Spices: Listing of important spices, their family and part used. Economic importance with special reference to fennel, saffron, clove and black pepper	Credit:02 CLASSES ALLOTED (60 lectures)	Class taken by Dr. Nilay Kumar Maitra	Remark
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Unit 6: Beverages: Tea, Coffee (morphology, processing & uses) Unit 7: Sources of oils and fats: General description, classification, extraction, their uses and health implications groundnut, coconut, linseed, soybean, mustard and coconut (Botanical name, family & uses). Essential Oils: General account, extraction methods, comparison with fatty oils & their uses. Unit 8: Natural Rubber: Para-rubber: tapping, processing and uses. Unit 9: Drug-yielding plants: Therapeutic and habit-forming drugs with special reference to Cinchona, Digitalis, Papaver and Cannabis; Tobacco (Morphology, processing, uses and health hazards). Unit 10: Timber plants: General account with special reference to teak and pine.			

Semester III (AY 2017-2020)		Period:	to		
Paper:	CC6P (Economic Botany) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
No.	1. Cereals: Wheat (habit sketch, L. S/T.S. gr chemical tests) Rice (habit sketch, study of pmicro-chemical tests). 2. Legumes: Soybean, Groundnut, (habit, frechemical tests). 3. Sources of sugars and starches: Sugarcane micro-chemical tests), Potato (habit sketch, show localization of starch grains, w.m. startests). 4. Spices: Black pepper, Fennel and Clove (15. Beverages: Tea (plant specimen, tea leave beans). 6. Sources of oils and fats: Coconut- T.S. nu seeds; tests for fats in crushed seeds. 7. Essential oil-yielding plants: Habit sketch and Eucalyptus (specimens/photographs). 8. Rubber: specimen, photograph/model of t products. 9. Drug-yielding plants: Specimens of Digitation of Tobacco: specimen and products of Tobacto: Tectona, Pinus: Specimen, Section 11. Woods: Tectona, Pinus: Specimen, Section 12. Fiber-yielding plants: Cotton (specimen,	paddy and grain, starch grains and, seed structure, micro- e (habit sketch; cane juice- tuber morphology, T.S. tuber ch grains, micro-chemical habit and sections). es), Coffee (plant specimen, t, Mustard–plant specimen, of Rosa, Vetiveria, Santalum apping, samples of rubber alis, Papaver and Cannabis. acco. on of young stem.	(24 lectures)	Dr. Nilay Kumar Maitra	

Semes	ster III (AY 2017-2020)	Period:		to		
Paper:	Paper: CC7T (Genetics) (Theory)		40	Cr	edit:04	
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian genetics and its extension Mendelism: History; Principles of inheritance; Chromosome theory of inheritance; Autosomes and sex chromosomes; Probability and pedigree analysis; Incomplete dominance and codominance; Multiple alleles, Lethal alleles, Epistasis, Pleiotropy, Recessive and Dominant traits, Penetrance and Expressivity, Numericals; Polygenic inheritance.		(16 lectures)	SkMd Ismail Al Amin		
2	Unit 2: Extrachromosomal Inheritance Chloroplas Four o'clock plant; Mitochondrial mutations in ye- coiling in snail; Infective heredity- Kappa particles	ast; Maternal effec		(6 lectures)	SkMd Ismail Al Amin	

3	Unit 3: Linkage, crossing over and chromosome mapping Linkage and crossing over-Cytological and molecular basis of crossing over; Recombination frequency, two factor and three factor crosses; Interference and coincidence; Numericals based on gene mapping; Sex Linkage.	(12 lectures)	SkMd Ismail Al Amin
4	Unit 4: Variation in chromosome number and structure Deletion, Duplication, Inversion, Translocation, Position effect, Euploidy and Aneuploidy	(8 lectures)	SkMd Ismail Al Amin
5	Unit 5: Gene mutations Types of mutations; Molecular basis of Mutations; Mutagens – physical and chemical (Base analogs, deaminating, alkylating and intercalating agents); Detection of mutations: CIB method. Role of Transposons in mutation.DNA repair mechanisms.	(6 lectures)	SkMd Ismail Al Amin
6	Unit 6: Fine structure of gene Classical vs molecular concepts of gene; Cis- Trans complementation test for functional allelism; Structure of Phage T4, rII Locus.	(6 lectures)	SkMd Ismail Al Amin
7	Unit 6. Population and Evolutionary Genetics Allele frequencies, Genotype frequencies, Hardy-Weinberg Law, role of natural selection, mutation, genetic drift. Genetic variation and Speciation.	(6 lectures)	SkMd Ismail Al Amin

Semes	ster III (AY 2017-2020)	to			
Paper:	Paper: CC7P (Genetics) (Practical) Full Marks: 20		Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Demonstration on pretreatment, fixation squash and smear preparation.	on, staining and	(40 lectures)	SkMd Ismail Al Amin	
2	2. Study of Mitosis from Onion / Garlic /	Lentil root.		SkMd Ismail Al Amin	
3	3. Study of Meiosis with pollen mother cell (PMC) of Onion / Solanum / Datura by smear preparation.			SkMd Ismail Al Amin	
4	4. Mendel's laws through seed ratios. Lal probability and chi-square.	boratory exercises in		SkMd Ismail Al Amin	
5	5. Chromosome mapping using point test	t cross data.		SkMd Ismail Al Amin	
6	6. Pedigree analysis for dominant and rec sex linked traits	essive autosomal and		SkMd Ismail Al Amin	
7	7. Incomplete dominance and gene interaratios (9:7, 9:6:1, 13:3, 15:1, 12:3:1, 9:3:4			SkMd Ismail Al Amin	
8	8. Blood Typing: groups & Rh factor.			SkMd Ismail Al Amin	

9	9. Study of aneuploidy: Down's, Klinefelter's and Turner's syndromes.	SkMd Ismail Al Amin	
10	10. Photographs/Permanent Slides showing Translocation Ring, Laggards and Inversion Bridge.	SkMd Ismail Al Amin	
11	11. Study of human genetic traits: Sickle cell anemia, Xeroderma Pigmentosum, Albinism, red-green Colour blindness, Widow's peak, Rolling of tongue, Hitchhiker's thumb and Attached ear lobe	SkMd Ismail Al Amin	

Semester III (AY 2017-2020)		Period:	to		
Paper:	SEC1T (Biofertilizers) (Theory)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: General account about the microbes used as biofertilizer – Rhizobium – isolation, identification, mass multiplication, carrier based inoculants, Actinorrhizal symbiosis.		(4 lectures)	Dr. Nilay Kumar Maitra	
2	based inoculant, associative effect of different microorganisms. Azotobacter: classification, of	nicroorganisms. Azotobacter: classification, characteristics – crop esponse to Azotobacter inoculum, maintenance and mass		Dr. Nilay Kumar Maitra	
3	Unit 3: Cyanobacteria (blue green algae), Azolla and Anabaena azollae association, nitrogen fixation, factors affecting growth, blue green algae and Azolla in rice cultivation.		(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit 4: Mycorrhizal association, types of mycorrange and distribution, phosp and yield – colonization of VAM – isolation production of VAM, and its influence on grouplants.	ohorus nutrition, growth and inoculum	(8 lectures)	Dr. Nilay Kumar Maitra	
5	Unit 5: Organic farming – Green manuring at Recycling of biodegradable municipal, agricu wastes – biocompost making methods, types vermicomposting – field Application.	ıltural and Industrial	(6 lectures)	Dr. Nilay Kumar Maitra	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Botally Hollours, CDCS)							
Semes	ster IV (AY 2017-2020)	Period:	to				
Paper:	CC8T (Molecular Biology) (Theory)	Full Marks:	Credi	t:			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark		
1	Unit- 1: Nucleic acids: Carriers of genetic information Historical perspective; DNA as the carrier of genetic information (Griffith's, Hershey		(60	SkMd Ismail			

	& Chase, Avery, McLeod & McCarty, Fraenkel-Conrat's experiment.	lectures)	Al Amin	
2	Unit -2. The Structures of DNA and RNA / Genetic Material DNA Structure: Miescher to Watson and Crick- historic perspective, DNA structure, Salient features of double helix, Types of DNA, Types of genetic material, denaturation and renaturation, cot curves; Organization of DNA-Prokaryotes, Viruses, Eukaryotes.RNA Structure-Organelle DNA mitochondria and chloroplast DNA.TheNucleosomeChromatin structure- Euchromatin, Heterochromatin- Constitutive and Facultative heterochromatin.			
3	Unit- 2:The replication of DNA Chemistry of DNA synthesis (Kornberg's discovery); General principles – bidirectional, semiconservative and semi discontinuous replication, RNA priming; Various models of DNA replication, including rolling circle, θ (theta) mode of replication, replication of linear ds-DNA, replication of the 5'end of linear chromosome; Enzymes involved in DNA replication.			
4	Unit- 3: Central dogma and genetic code Key experiments establishing-The Central Dogma (Adaptor hypothesis and discovery of mRNA template), Genetic code (deciphering & salient features)			
5	Unit 4: Transcription Transcription in prokaryotes and eukaryotes. Principles of transcriptional regulation; Prokaryotes: Regulation of lactose metabolism and tryptophan synthesis in E.coli. Eukaryotes:transcription factors, heat shock proteins, steroids and peptide hormones; Gene silencing.	(60 lectures)	Susanta Kumar Maity	
6	Unit 5: Processing and modification of RNA Split genes-concept of introns and exons, removal of introns, spliceosome machinery, splicing pathways, group I and group II intron splicing, alternative splicing eukaryotic mRNA processing(5' cap, 3' polyA tail); Ribozymes; RNA editing and mRNA transport.			
7	Unit 6: Translation Ribosome structure and assembly, mRNA; Charging of tRNA, aminoacyl tRNAsynthetases; Various steps in protein synthesis, proteins involved in initiation, elongation and termination of polypeptides; Fidelity of translation; Inhibitors of protein synthesis; Post-translational modifications of proteins.			

Semes	ster IV (AY 2017-2020)	Period:	to		
Paper	: CC8P (Molecular Biology) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Preparation of LB medium and raising E.Coli. Solution of genomic DNA from <i>E.Coli</i> .		(30 lectures)	SkMd Ismail Al Amin	
	3. DNA isolation from cauliflower head. 4. DNA estimation by diphenylamine reagent/UV	Spectrophotometry	& &		
	Study of DNA replication mechanisms through circle, Theta replication and semi-discontinuous replication.	photographs (Rolling		Susanta Kumar Maity	
	6. Study of structures of prokaryotic RNA polymerase II through photographs	erase and eukaryotic RNA			
	7. Photographs establishing nucleic acid as genetic Stahl's, Avery et al, Griffith's, Hershey & Chase's experiments)	*			
	8. Study of the following through photographs: As	ssembly of Spliceosome	1		

machinery; Splicing mechanism in group I & group II introns; Ribozyme and		
Alternative splicing.		

Semes	ster IV (AY 2017-2020)	Period:	to		
-	CC9T (Plant Ecology and geography) (Theory)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction Basic concepts; Levels of organization. Inter-relationships between the living world and the environment, the components and dynamism, homeostasis.		(60 lectures)	Dr. Nilay Kumar Maitra	
2	Unit 2: Soil Importance; Origin; Formation Physical; Chemical and Biological composition of climate in soil development.	•		Dr. Nilay Kumar Maitra	
3	Unit 3: Water Importance: States of water Atmospheric moisture; Precipitation type hail, dew); Hydrological Cycle; Water in	s (rain, fog, snow,		Dr. Nilay Kumar Maitra	
4	Unit 4: Light, temperature, wind and fire adaptations of plants to their variation.	Variations;		Dr. Nilay Kumar Maitra	
5	Unit 5: Ecosystems Structure; Processes; organisation; Food chains and Food webs pyramids.	-		Dr. Nilay Kumar Maitra	
6	Unit 6: Population ecology Characteristic .Ecological Speciation	s and Dynamics		Dr. Nilay Kumar Maitra	
7	Unit 7: Plant communities Concept of ecc Habitat and niche; Characters: analytical Ecotone and edge effect; Dynamics: succ types; climax concepts.	and synthetic;		Dr. Nilay Kumar Maitra	
8	Unit 8: Biotic interactions Trophic organi of energy, autotrophy, heterotrophy; symcommensalism, parasitism; food chains a pyramids; biomass, standing crop.	biosis,		Dr. Nilay Kumar Maitra	
9	Unit 9: Functional aspects of ecosystem I of energy flow; Production and productive efficiencies; Biogeochemical cycles; Cyc	ity; Ecological		Dr. Nilay Kumar Maitra	

Nitrogen and Phosph	orus.		
of tolerance; Endem biomes (one each fro	mphy Principles; Continental drift; Theory sm; Brief description of major terrestrial m tropical, temperate & tundra); ivision of India; Local Vegetation.	Dr. Nilay Kumar Maitra	

Semes	ster IV (AY 2017-2020)	Period:	to		
-	: CC9P (Plant Ecology and geography) (Practical)	Full Marks:	Credit:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measur variables: Soil thermometer, maximum thermometer, anemometer, psychrome gauge and lux meter.	n and minimum	(36 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH of various soil meter, universal indicator/Lovibond co			Dr. Nilay Kumar Maitra	
3	3. Analysis for carbonates, chlorides, n organic matter and base deficiency from			Dr. Nilay Kumar Maitra	
4	4. two soil samples by rapid field tests.			Dr. Nilay Kumar Maitra	
5	5. Determination of organic matter of of Walkley& Black rapid titration	different soil samples by		Dr. Nilay Kumar Maitra	
6	6. method			Dr. Nilay Kumar Maitra	
7	7. Comparison of bulk density, porosit of water in soils of three habitats.	y and rate of infiltration		Dr. Nilay Kumar Maitra	
8	8. Determination of dissolved oxygen of polluted and unpolluted sources.	of water samples from		Dr. Nilay Kumar Maitra	
9	9. (a). Study of morphological adaptatic xerophytes (four each). (b). Study of big following: Stem parasite (Cuscuta), Ro Epiphytes, Predation (Insectivorous plants)	iotic interactions of the oot parasite (Orobanche)		Dr. Nilay Kumar Maitra	
10	10. Determination of minimal quadrat herbaceous vegetation in the college ca curve method (species to be listed).	-		Dr. Nilay Kumar Maitra	
11	11. Quantitative analysis of herbaceous college campus for frequency and com Raunkiaer's frequency distribution law	parison with		Dr. Nilay Kumar Maitra	

12	12. Quantitative analysis of herbaceous vegetation for density	Dr. Nilay
	and abundance in the college campus. 13. Field visit to familiarise students with ecology of different sites.	Kumar Maitra

Seme	ster IV (AY 2017-2020)	Period:	to		
Paper	: CC10T (Plant Systematics) (Theory)	Full Marks:	Cred	lit:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Significance of Plant systematics Int Plant identification, Classification, Nomench palynology, cytology, phytochemistry and minventory; Functions of Herbarium; Importa gardens of the world and India; Virtual herb Documentation: Flora, Monographs, Journal and Multi-access.	ature. Evidences from nolecular data. Field nt herbaria and botanical arium; E-flora;	(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Taxonomic hierarchy Concept of tax species); Categories and taxonomic hierarch (taxonomic, biological, evolutionary).	,		Susanta Kumar Maity	
3	Unit 3: Botanical nomenclature Principles and names; Typification, author citation, val of names, principle of priority and its limitate	id publication, rejection		Susanta Kumar Maity	
4	Unit 4: Systems of classification Major cont Theophrastus, Bauhin, Tournefort, Linnaeus Bessey, Hutchinson, Takhtajan and Cronqui systems of Bentham and Hooker (upto series (upto series); Brief reference of Angiosperm (APG III) classification.	, Adanson, de Candolle, st; Classification s) and Engler and Prantl		Susanta Kumar Maity	
5	Unit 5: Biometrics, numerical taxonomy and Variations; OTUs, character weighting and of Phenograms, cladograms (definitions and di	coding; Cluster analysis;		Susanta Kumar Maity	
6	Unit 6: Phylogeny of Angiosperms Terms and advanced, homology and analogy, paral monophyly, Paraphyly, polyphyly and clade of angiosperms; Co-evolution of angiosperm of illustrating evolutionary relationship (phy cladogram).	lelism and convergence, s). Origin and evolution as and animals; Methods		Susanta Kumar Maity	

Semes	ster IV (AY 2017-2020)	Period:	to		
Paper:	CC10P (Plant Systematics) (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of vegetative and floral characte	rs of the following	(36	Susanta Kumar	

	families (Description, V.S. flower, section of ovary, floral diagram/s, floral formula/e and systematic position according to Bentham & Hooker's system of classification): 1. Ranunculaceae - Ranunculus, Delphinium. 2. Brassicaceae - Brassica, Alyssum / Iberis. 3. Malvaceae - Sida Sp. Urenalobota. 4. Myrtaceae - Eucalyptus, Callistemon 5. Umbelliferae - Coriandrum /Anethum / Foeniculum. 6. Asteraceae - Sonchus/Launaea, Vernonia/Ageratum, Eclipta/Tridax. 7. Solanaceae - Solanum nigrum/Withania, Nicotina, Plumbaginefolia. 8. Lamiaceae - Salvia/Ocimum. 9. Euphorbiaceae - Euphorbia hirta/E.milii, Jatropha. 10. Fasaceae - TephrosiaSp.,Crotalaria Sp., 11. Caesalpineaeceae - Cassia Sp., 12. Asclepiadaeceae- PesgulariaGygnema, 13. Apocynaceae - Hollorhen, Catharanthus. 14. Rubiaceae - Oldenladeae, Spermoeoceae,	lectures)	Maity
	14. Rubiaceae - Oidelhadeae, Spermococeae,15. Liliaceae - Asphodelus/Lilium/Allium.16. Poaceae - Triticum/Hordeum/Avena.		
2	2. Field visit (local) – Subject to grant of funds from the university.		Susanta Kumar Maity
3	3. Mounting of a properly dried and pressed specimen of any wild plant with herbarium label (to be submitted in the record book).		Susanta Kumar Maity

Semes	ster IV (AY 2017-2020)	Period:	to		
-	SEC2T (Mushroom areTechnology) (Theory)	Full Marks: 40	Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology : Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove,			Dr.Nilay Kumar	

	sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	Maitra
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra
4	Unit 4: Food Preparation:Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra

	Curriculum Plan (Botany Honours; CBC	S)		
Semes	ster V (AY 2017-2020)	Period:	to		
-	CC11T (Reproductive Biology of osperms) (Theory)	Full Marks: 40	Credit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction :History (contributions of E. Strasburger, S.G. Nawaschin, P. Maheshwari, Heslop-Harrison) and scope.		(60 lectures)	Susanta Kumar Maity	
2	Unit 2: Reproductive development : Induction of modified determinate shoot. Flower development aspects.			Susanta Kumar Maity	
3	Unit 3: Anther and pollen biology Anther wall: Structure and functions, microspord and its significance. Microgametogenesis; Poller germ unit) structure, NPC system; Palynology ar Pollen wall proteins; Pollen viability, storage and features: Pseudomonads, polyads, massulae, poll		Susanta Kumar Maity		
4	Unit 4: Ovule Structure; Types; Special structures—endothelium and hypostase; Female Gametophyte – megaspor bisporic and tetrasporic) and megagametogenesis <i>Polygonum</i> type); Organization and ultrastructure	, obturator, aril, caruncle ogenesis (monosporic, (details of		Susanta Kumar Maity	
5	Unit 5: Pollination and fertilization Pollination types and significance; adaptations; st path of pollen tube in pistil; double fertilization.			Susanta Kumar Maity	
6	Unit 6: Self incompatibility Basic concepts (interspecific, intraspecific, homo GSI and SSI); Methods to overcome self- incomp bud pollination, stub pollination; Intra-ovarian an Modification of stigma surface, parasexual hybrid fertilization.	patibility: mixed pollination, d in vitro pollination;		Susanta Kumar Maity	
7	Unit 7: Embryo, Endosperm and Seed Structure and types; General pattern of developm embryo and endosperm; Suspensor: structure and endosperm relationship; Nutrition of embryo; Un development in <i>Paeonia</i> . Seed structure, importan mechanisms	functions; Embryo- usual features; Embryo		Susanta Kumar Maity	

8	Units 7: Polyembryony and apomixis	Susanta	
	Introduction; Classification; Causes and applications.	Kumar	
		Maity	

Semester V (AY 2017-2020) Period:			to		
Paper: CC11P (Reproductive Biology of Angiosperms) (Practical) Full Marks: 20 Credit:02					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Anther: Wall and its ontogeny; Ta glandular); MMC, spore tetrads, uninucleat anther stages through slides/micrographs, through photographs and schematic represent	e, bicelled and dehisced male germ unit (MGU)	(40 lectures)	Susanta Kumar Maity	
2	2. Pollen grains: Fresh and acetolyzed shor aperture, psuedomonads, polyads, pollinia (material), ultrastructure of pollen wall(micro Tetrazolium test.germination: Calculation of in different media using hanging drop method	wing ornamentation and (slides/photographs,fresh ograph); Pollen viability: f percentage germination		Susanta Kumar Maity	
3	3. Ovule: Types-anatropou amphitropous/campylotropous, circinotropou Tenuinucellate and crassinucellate; Special obturator, hypostase, caruncle and slides/specimens/photographs).	us, unitegmic, bitegmic; structures: Endothelium,		Susanta Kumar Maity	
4	4. Female gametophyte through permanent sl Types, ultrastructure of mature egg apparatus			Susanta Kumar Maity	
5	5. Intra-ovarian pollination; Test tube photographs.	e pollination through		Susanta Kumar Maity	
6	6. Endosperm: Dissections of developing se free-nuclear haustoria.	eeds for endosperm with		Susanta Kumar Maity	
7	7. Embryogenesis: Study of development of permanent slides; dissection of developing various developmental stages; Study of sus micrographs	g seeds for embryos at		Susanta Kumar Maity	

Semes	ster V (AY 2017-2020)	Period:	to		
Paper: CC12T (Plant Physiology) (Theory) Full Marks:		Cred	it:		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant-water relations Water Potential and its components, water absorption by roots,		(60	Dr.Nilay Kumar	

2	aquaporins, pathway of water movement, symplast, apoplast, transmembrane pathways, root pressure, guttation. Ascent of sap – cohesion-tension theory. Transpiration and factors affecting transpiration, antitranspirants, mechanism of stomatal movement. Unit 2: Mineral nutrition Essential and beneficial elements, macro and micronutrients, methods of study and use of nutrient solutions, criteria for essentiality, mineral deficiency symptoms, roles of essential elements, chelating agents.	lectures)	Maitra Dr.Nilay Kumar Maitra
3	Unit 3: Nutrient Uptake Soil as a nutrient reservoir, transport of ions across cell membrane, passive absorption, electrochemical gradient, facilitated diffusion, active absorption, role of ATP, carrier systems, proton ATPase pump and ion flux, uniport, co-transport, symport, antiport.		Dr.Nilay Kumar Maitra
4	Unit 4: Translocation in the phloem Experimental evidence in support of phloem as the site of sugar translocation. Pressure–Flow Model; Phloem loading and unloading; Source–sink relationship.		Dr.Nilay Kumar Maitra
5	Unit 5: Plant growth regulators Discovery, chemical nature (basic structure), bioassay and physiological roles of Auxin, Gibberellins, Cytokinin, Abscisic acid, Ethylene, Brassinosteroids and Jasmonic acid.		Dr.Nilay Kumar Maitra
6	Unit 6: Physiology of flowering Photoperiodism, flowering stimulus, florigen concept, vernalization, seed dormancy.		Dr.Nilay Kumar Maitra
7	Unit 7: Phytochrome, crytochromes and phototropins Discovery, chemical nature, role in photomorphogenesis, low energy responses (LER) and high irradiance responses (HIR), mode of action.		Dr.Nilay Kumar Maitra

Semes	Gemester V (AY 2017-2020) Period:		to		
Paper:	: CC12P (Plant Physiology) (Practical)	Full Marks: 20	Credit:02		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determination of osmotic potential of plant comethod.	ell sap by plasmolytic	(40 lectures)	Dr.Nilay Kumar Maitra	
2	Determination of water potential of given weight method.	tissue (potato tuber) by		Dr.Nilay Kumar Maitra	
3	Study of the effect of wind velocity and light on the rate of transpiration in excised twig/leaf.			Dr.Nilay Kumar Maitra	
4	Calculation of stomatal index and stomatal surfaces of leaves of a mesophyte and xeroph			Dr.Nilay Kumar Maitra	
5	To calculate the area of an open stoma and open through stomata in a mesophyte and xer			Dr.Nilay Kumar Maitra	
6	To study the phenomenon of seed germinatio	n (effect of light).		Dr.Nilay Kumar Maitra	
7	To study the effect of different conce Avenacoleoptile elongation (IAA Bioassay).	entrations of IAA on		Dr.Nilay Kumar Maitra	

8	To study the induction of amylase activity in germinating barley grains.	Dr.Nilay Kumar Maitra
	Demonstration experiments	
	1. To demonstrate suction due to transpiration.	Dr.Nilay Kumar Maitra
	2. Fruit ripening/Rooting from cuttings (Demonstration).	Dr.Nilay Kumar Maitra
	3. Bolting experiment/Avenacoleptile bioassay (demonstration).	Dr.Nilay Kumar Maitra

Semes	Semester V (AY 2017-2020) Period:		to		
Paper:	DSE1 (Biostatistics) (Theory)	Full Marks: 40	Cr	edit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biostatistics Definition - statistical methods - basic - measurements, functions, limitations a		(60 lectures)	Dr.Nilay Kumar Maitra	
2	Unit 2: Collection of data primary and secondary Types and methods of data collection procedures - merits and demerits. Classification - tabulation and presentation of data - sampling methods.			Dr.Nilay Kumar Maitra	
3	Unit 3:Measures of central tendency Mean, median, mode, geometric mean - merits & demerits. Measures of dispersion - range, standard deviation, mean deviation, quartile deviation - merits and demerits; Coefficient of variations.			Dr.Nilay Kumar Maitra	
4	Unit 4: Correlation Types and methods of correlation, regression equation, fitting prediction dissimilarities of correlation and regression.	on, similarities and			
5	Unit 5: Statistical inference Hypothesis - simple hypothesis - studer test.			Dr.Nilay Kumar Maitra	

Semes	ster V (AY 2017-2020)	Period:	to		
Paper	Paper: DSE 1P (Biostatistics) (Practical) Full Marks: 20		Cr	redit:02	
Sl. No.	No. TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Calculation of mean, standard deviation and standard error		(40 lectures)	Dr.Nilay Kumar Maitra	
2	Calculation of correlation coefficient values and finding out the probability			Dr.Nilay Kumar	

		Maitra
3	Calculation of 'F' value and finding out the probability value for the F value.	Dr.Nilay Kumar Maitra

Semes	Semester V (AY 2017-2020) Period:		to		
Paper:	DSE2 (Plant Breeding) (Theory)	Full Marks: 40	Cr	redit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Plant Breeding Introduction and objectives. Breeding reproduction in crop plants. Importar undesirable consequences of plant breed	nt achievements and	(8 lectures)	SkMd Ismail Al Amin	
2	Unit 2: Methods of crop improvement Introduction: Centres of origin and deplants, plant genetic resources; Acclin methods: For self pollinated, crovegetatively propagated plants; Hybrocoss and vegetatively propagated advantages and limitations.	omestication of crop matization; Selection oss pollinated and ridization: For self,	(8 lectures)	Susanta Kumar Maity	
3	Unit 3: Quantitative inheritance Concept, mechanism, examples of incolour in wheat, Skin colour in human polygenic Inheritance.		(8 lectures)	SkMd Ismail Al Amin	
4	Unit 4: Inbreeding depression and he History, genetic basis of inbreeding heterosis; Applications.		(8 lectures)	Susanta Kumar Maity	
5	Unit 5: Crop improvement and breed Role of mutations; Polyploidy; Distant I role of biotechnology in crop improvem	hybridization and	(8 lectures)	SkMd Ismail Al Amin	

Curriculum Plan (EVEN SEMESTER) (Botany Honours; CBCS)

(Botany Honours; CBCS)					
Seme	ster VI (AY 2017-2020)	Period:	to		
Paper	: CC13T (Plant Metabolism) (Theory)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
	•	ion, anabolic and lism, role of modulation and ckground, anthetic pigments intenna molecules and is, photosynthetic D2 reduction, cean acid metabolism; sis and catabolism of e of pyruvate, see phosphate pathway, egulation of PDH, ole, anaplerotic condrial electron inide-resistant TP synthesis, substrate chanism (oxidative e, Boyers ent, Jagendorf's preakdown of ele, gluconeogenesis ag seed germination, a milation, biological ind non-legumes);	CLASSES	Class	Remark
	Unit 8: Mechanisms of signal transduction interactions; Second messenger concept, MAP kinase cascade				

Seme	ester VI (AY 2017-2020)	Period:	to		
Paper	:: CC13P Plant Metabolism (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS	.	CLASSES ALLOTED	Class taken by	Remark
1	 Chemical separation of photosynthetic. Experimental demonstration of Hill's. To study the effect of light intensity of photosynthesis. Effect of carbon dioxide on the rate of photosynthesis. To compare the rate of respiration in organic. To demonstrate activity of Nitrate recleaves of different plant sources. To study the activity of lipases in ger demonstrate mobilization of lipids 1. dut. Demonstration of fluorescence by isopigments. Demonstration of absorption spectrum pigments 	s reaction. In the rate of If photosynthesis. Idifferent parts of a Iductase in germinating Iminating oilseeds and ring germination. In the rate of	(35 lectures)	Dr.Nilay Kumar Maitra	

Semes	ster VI (AY 2017-2020)	Period:	to		
Paper: CC14T (Plant Biotechnology) (Theory) Full Mark		Full Marks:	Cred	it:	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit -1: Plant Tissue Culture Historical perspective Nutrient and hormone requirements (role of vitamic Totipotency; Organogenesis; Embryogenesis (som Protoplast isolation, culture and fusion; Tissue cult (micropropagation, androgenesis, virus elimination production, haploids, triploids and hybrids; Cryopi Conservation).	ins and hormones); atic and zygotic); ture applications n, secondary metabolite	(30 lectures)	Susanta Kumar Maity	
	Unit- 2: Recombinant DNA technology Restriction Endonucleases (History, Types I-IV, biological role and application); Unit - 5: Applications of Biotechnology Pest resistant (Bt-cotton); herbicide resistant plants (RoundUp Ready soybean); Transgenic crops with improved				

quality traits (Flavr Savr tomato, Golden rice); Improved horticultural varieties (Moondust carnations); Role of transgenics in bioremediation (Superbug); edible vaccines; Industrial enzymes (Aspergillase, Protease, Lipase); Gentically Engineered Products–Human Growth Hormone; Humulin; Biosafety concerns.			
2 Unit- 2: Restriction Mapping (Linear and Circular); Cloning Vectors: Prokaryotic (pUC 18 and pUC19, pBR322, Ti plasmid, BAC); Lambda phage, M13 phagemid, Cosmid, Shuttle vector; Eukaryotic Vectors (YAC). Unit- 3:Gene Cloning Recombinant DNA, Bacterial Transformation and selection of recombinant clones, PCRmediated gene cloning; Gene Construct; construction of genomic and cDNA libraries, screening DNA libraries to obtain gene of interest by genetic selection; complementation, colony hybridization; PCR Unit- 4: Methods of gene transfer Agrobacterium-mediated, Direct gene transfer by Electroporation, Microinjection, Microprojectile bombardment; Selection of transgenics—selectable marker and reporter genes (Luciferase, GUS, GFP).	(30 lectures)	SkMd Ismail Al Amin	

Semester V (AY 2017-2020) Period:		Period:	to		
Paper:	CC14P () (Practical)	Full Marks:	Cred	it:	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	 (a) Preparation of MS medium. (b) Demonstration of in vitro sterilization and inoculation methods using leaf and nodal explants of tobacco, Datura, Brassica etc. Study of anther, embryo and endosperm culture, micropropagation, somatic embryogenesis & artificial seeds through photographs. Isolation of protoplasts. 		(16 lectures)	Susanta Kumar Maity	
2	 Construction of restriction map of circulate the data provided. Study of methods of gene transfer throug Agrobacterium-mediated, direct gene transfer by electroporation, microinjectic bombardment. Study of steps of genetic engineering for Golden rice, Flavr Savr tomato through phoses. Isolation of plasmid DNA. Restriction digestion and gel electrophore. 	h photographs: on, microprojectile production of Bt cotton, tographs.	(16 lectures)	SkMd Ismail Al Amin	

Semester VI (AY 2017-2020)	Period:	to	
Paper: DSE3 (Industrial and Environmental	Full Marks:	Credit:	

Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Scope of microbes in industry and environment Unit 2: Bioreactors/Fermenters and fermentation processes Solid-state and liquid-state (stationary and submerged) fermentations; Batch and continuous fermentations. Components of a typical bioreactor, Types of bioreactorslaboratory, pilotscale and production fermenters; Constantly stirred tank fermenter, tower fermenter, fixed bed and fluidized bed bioreactors and air-lift fermenter. A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations. Unit 3: Microbial production of industrial products Microorganisms involved,	(50 lectures)	SkMd Ismail Al Amin	
	media, fermentation conditions, downstream processing and uses; Filtration, centrifugation, cell disruption, solvent extraction, precipitation and ultrafiltration, lyophilization, spray drying; Hands on microbial fermentations for the production and estimation (qualitative and quantitative) of Enzyme: amylase or lipase activity, Organic acid (citric acid or glutamic acid), alcohol (Ethanol) and antibiotic (Penicillin)		Susanta Kumar Maity	
	Unit 4: Microbial enzymes of industrial interest and enzyme immobilization Microorganisms for industrial applications_and hands on screening microorganisms for casein hydrolysis; starch hydrolysis; cellulose hydrolysis. Methods of immobilization, advantages and applications of immobilization, large scale applications of immobilized enzymes (glucose isomerase and penicillin acylase).			
	Unit 5: Microbes and quality of environment. Distribution of microbes in air; Isolation of microorganisms from soil, air and water.			
	Unit 6: Microbial flora of water. Water pollution, role of microbes in sewage and domestic waste water treatment systems. Determination of BOD, COD, TDS and TOC of water samples; Microorganisms as indicators of water quality, check coliform and fecal coliform in water samples.			
	Unit 7: Microbes in agriculture and remediation of contaminated soils. Biological fixation; Mycorrhizae; Bioremediation of contaminated soils. Isolation of root nodulating bacteria, arbuscular mycorrhizal colonization in plant roots.			

Semes	ster VI (AY 2017-2020)	Period:	to		
Paper: DSE3 (Industrial and Environmental Microbiology) (Practical) Full Mark		Full Marks:	Cred	it:	
Sl. No.	SI. No. TOPICS			Class taken by	Remark
1	Principles and functioning of instruments in microbiology laboratory		(30 lectures)	SkMd Ismail Al Amin	
	2. Hands on sterilization techniques and preparation of culture media.			& Susanta Kumar Maity	

Semester VI (AY 2017-2020)		Period:	to		
Paper: DSE4 (Analytical Techniques in Plant Sciences) (Theory)		Full Marks:	Credit:		
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Imaging and related techniques F microscopy; Light microscopy; Fluoresce Confocal microscopy; Use of fluorochron cytometry (FACS); (b) Applications of fl microscopy: Chromosome banding, FISH painting; Transmission and Scanning election sample preparation for electron microscopy negative staining, shadow casting, freeze etching. Unit- 2: Cell fractionation Centrifugation density gradient centrifugation, sucrose d CsCl2gradient, analytical centrifugation, marker enzymes. Unit- 3: Radioisotopes Use in biological radiography, pulse chase experiment. Unit- 4: Spectrophotometry Principle and biological research. Unit- 5: Chromatography Principle; Pape Column chromatography, TLC, GLC, HP chromatography; Molecular sieve chromatography. Unit- 6: Characterization of proteins and spectrometry; X-ray diffraction; X-ray cry Characterization of proteins and nucleic at AGE, PAGE, SDS-PAGE Unit- 7: Biostatistics Statistics, data, popuparameters; Representation of Data: Tabu Measures of central tendency: Arithmetic Measures of dispersion: Range, mean deviation; Chi-square test for go	ence microscopy; nes: (a) Flow uorescence I, chromosome etron microscopy – py, cryofixation, fracture, freeze : Differential and ensity gradient, ultracentrifugation, research, auto- I its application in r chromatography; PLC, Ionexchange atography; Affinity nucleic acids Mass systallography; acids; Electrophoresis: alation, samples, alar, Graphical; mean, mode, median; viation, variation,	(50 lectures)	SkMd Ismail Al Amin & Susanta Kumar Maity	

Semes	ter VI (AY 2017-2020)	Period:	to		
	Paper: DSE4 (Analytical Techniques in Plant Full Marks:			it:	
Science	ees) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Study of Blotting techniques: Southern, Northern and Western, DNA		(30	SkMd Ismail Al	

fingerprinting, DNA sequencing, PCR through photographs.	lectures)	Amin
2. Demonstration of ELISA.		
3. To separate nitrogenous bases by paper chromatography.		&
4. To separate sugars by thin layer chromatography.		Susanta
5. Isolation of chloroplasts by differential centrifugation.		Susanta Kumar Maity
6. To separate chloroplast pigments by column chromatography.		
7. To estimate protein concentration through Lowry's methods. 8. To separate proteins using PAGE.		
9. To separation DNA (marker) using AGE.		
10. Study of different microscopic techniques using photographs/micrographs (freeze fracture, freeze etching, negative staining, positive staining, fluorescence and FISH).11. Preparation of permanent slides (double staining)		

Curriculum Plan (ODD SEMESTER) (Botany GENERAL; CBCS)

		GENERAL; CBCS)			
	ster I (AY 2021-2023)		to		
Paper	: GE1T (Biodiversity (Microbes, Algae,	Full Marks: 40	Credit	t: 04	
Fungi	and Archegoniate)) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Microbes		(12	Sk Md	
-	Viruses – Discovery, general structure,	replication (general	lectures)	Ismail Al Amin	
	account), DNA virus (T-phage); Lytic a		lectures	Amin	
	RNA virus (TMV); Economic importan				
	Discovery, General characteristics and o				
	Reproduction – vegetative, asexual and				
	(conjugation, transformation and trans				
	importance.	,,			
2	Unit 2: Algae		(10	Susanta	
_	General characteristics; Ecology and dis	stribution: Range of	lectures)	Kumar	
	thallus organization and reproduction; (,	lectures	Maity	
	Morphology and life-cycles of the follo				
	Chlamydomonas, Oedogonium, Vauche	•			
	Polysiphonia. Economic importance of				
3	Unit 3: Fungi	Ø	(10	Dr. Nilay	
	Introduction- General characteris	tics, ecology and	lectures)	Kumar Maitra	
	significance, range of thallus org	, C3	,	iviaitia	
	composition, nutrition, reproduction and classification; True				
	Fungi- General characteristics, ecology and significance, life				
	cycle of Rhizopus (Zygomycota)				
	(Ascomycota), Puccinia, Agarica				
	Symbiotic Associations-Lichens:	General account,			
	reproduction and significance; Mycor	rhiza: ectomycorrhiza			
	and endomycorrhiza and their significan	nce.			
4	Unit 4: Introduction to Archegoniate		(10	Sk Md Ismail Al	
	Unifying features of archegoniates, Tr	ansition to land habit,	lectures)	Amin	
	Alternation of generations.				
5	Unit 5: Bryophytes				
	General characteristics, adaptation	s to land habit,			
	Classification, Range of thallus				
	organization.Classification (up to				
	anatomy and reproduction of				
	Funaria.(Developmental details not to	,			
	and economic importance of bryophyte	s with special mention			
	of Sphagnum.		/10	Cuasa-t-	
6	Unit 6: Pteridophytes	m Douby land1	(10	Susanta Kumar	
	General characteristics, classificatio		lectures)	Maity	
	(Cooksonia and Rhynia). Classification morphology, anatomy and reproduced				
	Equisetum and Pteris. (Development				
	included).Heterospory and seed ha				
	Ecological and economical importance				
	Deological and economical importance	o of f terruophytes.			
7	Unit 7: Gymnosperms		(4	Susanta	
,	General characteristics; Classification (up to family).	lectures)	Kumar	
	morphology, anatomy and reproduction	¥ /:		Maity	
	(Developmental details not to be included)				
	economical importance.	, 6			

Como	Stor I (AV 2021-2022)	Dowland: to				
	Semester I (AY 2021-2023) Period: to			Cradit. 02		
_	:: GE1P (Biodiversity (Microbes, Algae,	Full Marks: 20	Credit: 0	L		
Sl. No.	and Archegoniate)) (Practical) TOPICS		CLASSES	Class	Remark	
SI. NO.	TOPICS		ALLOTED	taken by	Remark	
1	1. EMs/Models of viruses – T-F drawing/Photograph of Lytic and Lysog 2. Types of Bacteria from temporary/per photographs; EM bacterium; Binary Fission; Conjugation; Structure of root 3. Gram staining	enic Cycle. rmanent slides/	(4 lectures)	Sk Md Ismail Al Amin		
2	3. Study of vegetative and reproduct	ive structures of <i>Nostoc</i> ,	(6	Susanta		
	Chlamydomonas (electron micrographs) Fucus* and Polysiphonia through ter permanent slides. (* Fucus - Specimen a	, Oedogonium, Vaucheria, mporary preparations and and permanent slides)	lectures)	Kumar Maity		
3	4. Rhizopus and Penicillium: Asexus mounts and sexual Structures through per 5. Alternaria: Specimens/photographs at 6. Puccinia: Herbarium specimens of E and infected Barberryleaves; section/te Wheat and permanent slides of both the 7. Agaricus: Specimens of button stage Sectioning of gills of Agaricus. 8. Lichens: Study of growth forms of lic fruticose) 9. Mycorrhiza: ecto mycorrhiza (Photographs)	ermanent slides. Ind tease mounts. Black Stem Rust of Wheat ease mounts of spores on hosts. and full grown mushroom; Thens (crustose, foliose and	(6 lectures)	Dr. Nilay Kumar Maitra		
4	10. <i>Marchantia</i> - morphology of thallus, v.s. thallus through gemmacup, w.m. slides), v.s. antheridiophore, archegonic permanent slides). 11. <i>Funaria</i> - morphology, w.m. le peristome, annulus, spores(temporary showing antheridial and archegonial protonema.	gemmae (all temporary ophore, l.s. sporophyte (all af, rhizoids, operculum, slides); permanent slides	(4 lectures)	Sk Md Ismail Al Amin		
	12. Selaginella- morphology, w.m. leaf strobilus, w.m.microsporophyll and m slides), l.s. strobilus (permanent slide). 14. Equisetum- morphology, t.s. intestrobilus, w.m. sporangiophore,w.m. dry)(temporary slides); t.s rhizome (permanent slide). 13. Pteris- morphology, t.s. rachis sporangium, w.m. spores(temporary slides) prothallus with sex organs and youn slide). 14. Cycas- morphology (coralloid roots, root, t.s. rachis, v.s. leaflet,v.s. microt(temporary slides), l.s. ovule, t.s. root (p. 15. Pinus- morphology (long and dwarf male and female), w.m.dwarf shoot, t.s. male cone, w.m. microsporophyll, w.m. slides), l.s. female cone, t.l.s. &r.l.s. ster.	egasporophyll (temporary ernode, l.s. strobilus, t.s. m. spores (wet and manent slide). , v.s. sporophyll, w.m. lides), t.s. rhizome, w.m. g sporophyte (permanent bulbil, leaf), t.s. coralloid osporophyll, w.m. spores ermanent slide). shoots, w.m. dwarf shoot, needle, t.s. stem, , l.s./t.s. microspores (temporary	(6 lectures)	Susanta Kumar Maity		

Curriculum Plan (ODD SEMESTER) (Botany GENERAL; CBCS)

Semes	ster II (AY 2021-2023)	Period:	to		
	: GE2T (Plant Ecology and Taxonomy)	Full Marks: 40		it: 04	
(Theo	•	1 4.1.1 141.1.01	0.00		
Sl. No.	TOPICS		CLASSES	Class	Remark
1	TT .'4 . 1 . T .4 34'		ALLOTED	taken by Dr. Nilay	
1	Unit-1: Introduction		(4	Kumar	
	Unit- 2: Ecological factors	1 (1 337)	lectures)	Maitra	
	Soil: Origin, formation, composition, so				
	States of water in the environment, prec				
	Light and temperature: Variation Optim				
	factors; Shelford law of tolerance. Adaptation of				
_	hydrophytes and xerophytes			D. MII	
2	Unit -3: Plant communities		(2	Dr. Nilay Kumar	
	Characters; Ecotone and edge effect; Succession; Processes		lectures)	Maitra	
	and types			D 37"	
3	Unit- 4: Ecosystem		(4	Dr. Nilay Kumar	
	Structure; energy flow trophic organi		lectures)	Maitra	
	and food webs, Ecological pyrami	*			
	productivity; Bio-geochemical cycling	; Cycling of carbon,			
	nitrogen and Phosphorous				
4	Unit- 5: Phytogeography		(2	Dr. Nilay Kumar	
	Principle of Biogeographical zone; End	emism.	lectures)	Maitra	
5	Unit- 6: Introduction to plant taxono	my	(2	Susanta	
	Identification, Classification, Nomencla	iture.	lectures)	Kumar	
6	Unit- 7: Identification		(2	Maity Susanta	
O		namia and hataniaal	,	Kumar	
	Functions of Herbarium, important herb gardens of the world and India; Docume		lectures)	Maity	
		chianon. Piora,			
7	Keys: single access and multi-access Unit 8: Taxonomic evidences from page 1.	alvnology sytology	(2	Susanta	
,		arynology, cytology,	· •	Kumar	
	phytochemistry and molecular data.		lectures)	Maity	
8	Unit 9: Taxonomic hierarchy		(2	Susanta	
	Ranks, categories and taxonomic group	S	lectures)	Kumar	
			· .	Maity	
9	Unit 10: Botanical nomenclature	1	(4	Susanta Kumar	
	Principles and rules (ICN); ranks and na	*	lectures)	Maity	
	system, typification, author citation, val			1.14109	
4.0	rejection of names, principle of priority	and its limitations.	/0	G :	
10	Unit 11: Classification	1 1 1 1	(2	Susanta Kumar	
	Types of classification-artificial, natural	1 2 0	lectures)	Maity	
	Bentham and Hooker (upto series), Eng	ier and Pranti (upto		1.14109	
	series).	7 3 30 /0	10	C	
	Unit 12: Biometrics, numerical taxon		(2	Susanta Kumar	
	Characters; variations; OTUs, character weighting and		lectures)	Maity	
	coding; cluster analysis; phenograms, cl	ladograms		ivialty	
	(definitions and differences).				

Semes	ster II (AY 2021-2023)	Period:	to		
_	:: GE2P (Plant Ecology and Taxonomy)	Full Marks: 20	Credi	t: 02	
(Pract					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure variables: Soil thermometer, maximum thermometer, anemometer, psychrometer gauge and lux meter.	and minimum	(2 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH, and analysis of carbonates, chlorides, nitrates, sulphates base deficiency by rapid field test.		(3 lectures)	Dr. Nilay Kumar Maitra	
3	3. Comparison of bulk density, porosity infiltration of water in soil of three habit		(3 lectures)	Dr. Nilay Kumar Maitra	
4	4. (a) Study of morphological adaptation xerophytes (four each). (b)Study of biot following: Stem parasite (<i>Cuscuta</i>), Roc (<i>Orobanche</i>), Epiphytes, Predation (Inse	(4 lectures)	Susanta Kumar Maity		
	5. Determination of minimal quadrat siz herbaceous vegetation in the college car curve method. (species to be listed)	•	(2 lectures)	Dr. Nilay Kumar Maitra	
	6. Quantitative analysis of herbaceous v college campus for frequency and comp Raunkiaer's frequency distribution law	_	(2 lectures)	Dr. Nilay Kumar Maitra	
	7. Study of vegetative and floral character families (Description, V.S. flower, section diagram/s, floral formula/e and systemate to Bentham & Hooker's system of classification):Brassicaceae - Brassica, Asteraceae - Sonchus/Launaea, Vernonia Eclipta/Tridax; Solanaceae - Solanum ni Lamiaceae - Salvia, Ocimum; Liliaceae - / Allium.	on of ovary, floral tic position according alyssum / Iberis; a/Ageratum, grum, Withania;	(8 lectures)	Susanta Kumar Maity	
	8. Mounting of a properly dried and preswild plant with herbarium label (to be subook).		(4 lectures)	Sk Md Ismail Al Amin	

Curriculum Plan (ODD SEMESTER) (Botany GENERAL; CBCS)

Semester III (AY 2021-2023) Period: to							
Paper	Paper: GE3T (Economic Botany and Plant Full Marks: 40 Credit: 04						
Biotec	Biotechnology) (Theory)						
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark	
1	Unit 1: Origin of Cultivated Plants: Concept	of centres of	f	(4	Dr. Nilay Kumar		
	origin, their importance with reference to V	/avilov's wor	k.	lectures)	Maitra		
2	Unit 2: Cereals: Wheat -Origin, morphology, uses			(2	Dr. Nilay		
				lectures)	Kumar Maitra		
3	Unit 3: Legumes: General account with spec	cial reference	e to	(2	Dr. Nilay		
	Gram and soybean			lectures)	Kumar Maitra		
4	Unit 4: Spices: General account with special	l reference to	o clove	(2	Dr. Nilay Kumar		
	and black pepper (Botanical name, family, p	oart used,		lectures)	Maitra		
	morphology and uses)						
5	U nit 5: Beverages :Tea (morphology, proce	essing, uses)		(2	Dr. Nilay Kumar		
				lectures)	Maitra		
6	Unit 6: Oils and Fats: General description w	ith special		(2	Dr. Nilay Kumar		
	reference to groundnut			lectures)	Maitra		
7	Unit 7: Fibre Yielding Plants: General descri	ption with sp	pecial	(2	Dr. Nilay Kumar		
	reference to Cotton (Botanical name, family	y, part used,		lectures)	Maitra		
	morphology and uses)						
8	Unit 8: Introduction to biotechnology			(2	Susanta		
				lectures)	Kumar Maity		
9	Unit 9: Plant tissue culture: Micropropagati	ion : hanloid		(8	Susanta		
	production through androgenesis and gyno	•	ef	lectures)	Kumar		
	account of embryo and endosperm culture	_		, , ,	Maity		
	applications.						
10	Unit 10: Recombinant DNA Techniques Blot	tting techniq	ues:	(10	Sk Md		
	Northern, Southern and Western Blotting, I	DNA		lectures)	Ismail		
	Fingerprinting; Molecular DNA markers i.e.	RAPD, RFLP,	SNPs;		Al Amin		
	DNA sequencing, PCR and Reverse Transcrip				AIIIII		
	Hybridoma and monoclonal antibodies, ELIS						
	detection. Molecular diagnosis of human di	isease, Huma	an				
	gene Therapy						

Semester III (AY 2021-2023)		Period:	to		
Paper: GE3P (Economic Botany and Plant		Full Marks: 20	Credit:02		
Biotechnology) (Practical)					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of economically important plants Soybean, Black pepper, Clove Tea, Cotton		(6 lectures)	Dr. Nilay Kumar	
	specimens, sections and micro chemical t	•	lectures)	Maitra	
2	2. Familiarization with basic equipments i	n tissue culture.	(2 lectures)	Susanta Kumar Maity	
3	3. Study through photographs: Anther cul embryogenesis, endosperm and embryo omicropropagation.	•	(2 lectures)	Susanta Kumar Maity	
4	4. Study of molecular techniques: PCR, Bloand PAGE.	otting techniques, AGE	(4 lectures)	Sk Md Ismail Al Amin	

Semester III (AY 2021-2023)		Period:	to		
Paper: SEC1T (Biofertilizers) (Theory) Full Ma		Full Marks: 40	Cred	lit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: General account about the microbe	s used as biofertilizer -	(40	Dr.Nilay	
	Rhizobium – isolation, identification, mass based inoculants, Actinorrhizal symbiosis.	s multiplication, carrier	lectures)	Kumar Maitra	
	Unit- 2: Azospirillum: isolation and mass	*			
	,	ect of different			
	microorganisms. Azotobacter: classification,				
	response to Azotobacter inoculum, m multiplication.				
	Unit- 3: Cyanobacteria (blue green algae),				
	azollae association, nitrogen fixation, factors	s affecting growth, blue			
	green algae and Azolla in rice cultivation.				
	Unit- 4: Mycorrhizal association, types of a taxonomy, occurrence and distribution, phos	•			
	and yield – colonization of VAM – isolation a				
	of VAM, and its influence on growth and yield				
	Unit-5: Organic farming – Green manuring				
	Recycling of biodegradable municipal, agr				
	wastes - biocompost making methods,	types and method of			
	vermicomposting – field Application.				

Curriculum Plan (EVEN SEMESTER) (Botany GENERAL; CBCS)

Semester IV (AY 2021-2023)		Period:	to		
Paper: GE4T (Plant Anatomy and Full M		Full Marks: 40	Cred	lit:04	
Embr	yology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Meristematic and permanent tissues		(2	Susanta	
	Root and shoot apical meristems; Simple and complex		lectures)	Kumar Maity	
	tissues		,		
2	U nit 2: Organs		(4	Susanta Kumar	
	Structure of dicot and monocot root sten	n and leaf.	lectures)	Maity	
3	Unit 3: Secondary Growth		(4	Susanta Kumar	
	Vascular cambium – structure and funct	ion, seasonal activity.	lectures)	Maity	
	Secondary growth in root and stem, W	Vood (heartwood and			
	sapwood)				
4	Unit 4: Adaptive and protective system		(4 lectures)	Susanta Kumar	
	Epidermis, cuticle, stomata; General account of adaptations			Maity	
	in xerophytes and hydrophytes.			G	
5	Unit 5: Structural organization of flov		(4	Susanta Kumar	
	Structure of anther and pollen; Structure		lectures)	Maity	
	Types of embryo sacs, organization and	ultrastructure of			
	mature embryo sac.		/ 4	Susanta	
6	Unit 6: Pollination and fertilization	. Daubla	(4	Kumar	
	Pollination mechanisms and adaptations		lectures)	Maity	
	fertilization; Seed-structure appendages mechanisms.	and dispersal			
	inculanishis.				
7	Unit 7: Embryo and endosperm		(4	Susanta	
	Endosperm types, structure and function	s; Dicot and	lectures)	Kumar Maity	
	monocot embryo; Embryo endosperm re				
	Unit 8: Apomixis and polyembryony		(4	Susanta	
	Definition, types and Practical application	ons	lectures)	Kumar Maity	

Semes	ster IV (AY 2021-2023)	to			
_	: GE4P (Plant Anatomy and	Full Marks: 20	Cred	lit: 02	
Embryology) (Practical)					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of meristems through pe photographs.		(1 lectures)	Susanta Kumar Maity	
2	2. Tissues (parenchyma, collenchyma and sclerenchyma); Macerated xylary elements, Phloem (Permanent slides, photographs)			Susanta Kumar Maity	
3	3. Stem: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
4	4. Root: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	· •	(1 lectures)	Susanta Kumar Maity	
5	5. Leaf: Dicot and Monocot leaf (only P	ermanent slides).	(1 lectures)	Susanta Kumar Maity	
6	6. Adaptive anatomy: Xerophyte (<i>Nerial (Hydrilla</i> stem).	um leaf); Hydrophyte	(2 lectures)	Susanta Kumar Maity	
7	7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).			Susanta Kumar Maity	
8	8. Types of ovules: anatropous, orthotropous, circinotropous, amphitropous/ campylotropous.			Susanta Kumar Maity	
9	9. Female gametophyte: <i>Polygonum</i> (mo Embryo sac Development (Permanent sl	lides/photographs).	(1 lectures)	Susanta Kumar Maity	
10	10. Ultrastructure of mature egg apprelectron micrographs.		(1 lectures)	Susanta Kumar Maity	
11	11. Pollination types and seed dispersal mechanisms (including appendages, aril, caruncle) (Photographs and specimens).			Susanta Kumar Maity	
12	12. Dissection of embryo/endosperm from developing seeds.		(1 lectures)	Susanta Kumar Maity	
13	13. Calculation of percentage of germin medium.	ated pollen in a given	(1 lectures)	Susanta Kumar Maity	

Seme	ster IV (AY 2021-2023)	Period:	to		
Paper: SEC2T (Mushroom		Full Marks: 40	Credit:04		
Cultu	reTechnology) (Theory)				
Sl. No.			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional a edible mushrooms; Poisonous mushrooms. Ty available in India - Volvariellavolvacea, Agaricusbisporus.	pes of edible mushrooms	TIBES TEE	Dr.Nilay Kumar Maitra	

2	Unit 2: Cultivation Technology: Infrastructure: substrates (locally available) Polythene bag, vessels, Inoculation hook, inoculation loop, low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.	Dr.Nilay Kumar Maitra	
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral elements nutrition - Carbohydrates, Crude fibre content - Vitamins.	Dr.Nilay Kumar Maitra	
4	Unit 4: Food Preparation: Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra	

		GENERAL; CBCS)			
Semester I (AY 2020-2022) Period: to					
Paper	: GE1T (Biodiversity (Microbes, Algae,	Full Marks: 40	Credi	t: 04	
Fungi	and Archegoniate)) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Microbes		(12	Sk Md	
-	Viruses – Discovery, general structure,	replication (general	lectures)	Ismail Al Amin	
	account), DNA virus (T-phage); Lytic a		lectures	Amin	
	RNA virus (TMV); Economic importan				
	Discovery, General characteristics and o				
	Reproduction – vegetative, asexual and				
	(conjugation, transformation and trans				
	importance.	,,			
2	Unit 2: Algae		(10	Susanta	
_	General characteristics; Ecology and dis	stribution: Range of	lectures)	Kumar	
	thallus organization and reproduction; (,	lectures	Maity	
	Morphology and life-cycles of the follo				
	Chlamydomonas, Oedogonium, Vauche	•			
	Polysiphonia. Economic importance of				
3	Unit 3: Fungi	<u> </u>	(10	Dr. Nilay	
-	Introduction- General characteris	tics, ecology and	lectures)	Kumar Maitra	
	significance, range of thallus org	, C3	,	Widitia	
	composition, nutrition, reproduction as				
	Fungi- General characteristics, ecology				
	cycle of Rhizopus (Zygomycota)				
	(Ascomycota), Puccinia, Agarici				
	Symbiotic Associations-Lichens:	General account,			
	reproduction and significance; Mycor				
	and endomycorrhiza and their significan	nce.			
4	Unit 4: Introduction to Archegoniate		(10	Sk Md Ismail Al	
	Unifying features of archegoniates, Tr	ansition to land habit,	lectures)	Amin	
	Alternation of generations.				
5	Unit 5: Bryophytes				
	General characteristics, adaptation	s to land habit,			
	Classification, Range of thallus				
	organization.Classification (up to				
	anatomy and reproduction of				
	Funaria.(Developmental details not to	,			
	and economic importance of bryophyte	s with special mention			
<i>C</i>	of Sphagnum.		/10	Susanta	
6	Unit 6: Pteridophytes	n Forty land plants	(10	Kumar	
	General characteristics, classificatio (Cooksonia and Rhynia). Classification		lectures)	Maity	
	morphology, anatomy and reprodu				
	Equisetum and Pteris. (Development				
	included).Heterospory and seed ha				
	Ecological and economical importance				
	2501051car and coordinate importance	of it torrate print too.			
7	Unit 7: Gymnosperms		(4	Susanta	
-	General characteristics; Classification (up to family),	lectures)	Kumar	
	morphology, anatomy and reproduction	• / ·		Maity	
	(Developmental details not to be include	· ·			
	economical importance.				
					_

	C + 1(1)(2020-2022)				
	ster I (AY 2020-2022)	Period: to	G 11 0		
Paper: GE1P (Biodiversity (Microbes, Algae, Full Marks: 20			Credit: 0	2	
	and Archegoniate)) (Practical)		CI ACCEC	CI	D 1
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. EMs/Models of viruses - T-F	_	(4	Sk Md Ismail Al	
	drawing/Photograph of Lytic and Lysog		lectures)	Amin	
	2. Types of Bacteria from temporary/per	manent slides/			
	photographs; EM bacterium; Binary				
	Fission; Conjugation; Structure of root	nodule.			
2	3. Gram staining	ive atmestumes of Master	IC	Susanta	
2	3. Study of vegetative and reproduct		(6	Kumar	
	Chlamydomonas (electron micrographs) Fucus* and Polysiphonia through ter		lectures)	Maity	
	permanent slides. (* Fucus - Specimen a				
3	4. Rhizopus and Penicillium: Asexua		(6	Dr. Nilay	
3	mounts and sexual Structures through pe		lectures)	Kumar	
	5. <i>Alternaria:</i> Specimens/photographs and		lectures	Maitra	
	6. <i>Puccinia</i> : Herbarium specimens of E				
	and infected Barberryleaves; section/te				
	Wheat and permanent slides of both the	hosts.			
	7. Agaricus: Specimens of button stage	and full grown mushroom;			
	Sectioning of gills of <i>Agaricus</i> .				
	8. Lichens: Study of growth forms of lic	thens (crustose, foliose and			
	fruticose)				
	9. Mycorrhiza: ecto mycorrhiza	and endo mycorrhiza			
	(Photographs)	1' '1 1 1	/ 4	Sk Md	
4	10. <i>Marchantia</i> - morphology of thallus, v.s. thallus through gemmacup, w.m.		(4	Ismail Al	
	slides), v.s. antheridiophore, archegonic		lectures)	Amin	
	permanent slides).	opnore, i.s. sporophyte (an			
	11. Funaria- morphology, w.m. le.	af. rhizoids, operculum,			
	peristome, annulus, spores(temporary	-			
	showing antheridial and archegonial	, -			
	protonema.	•			
	12. Selaginella- morphology, w.m. leaf	with ligule, t.s. stem, w.m.	(6	Susanta	
	strobilus, w.m.microsporophyll and m	egasporophyll (temporary	lectures)	Kumar Maity	
	slides), l.s. strobilus (permanent slide).			Maity	
	14. Equisetum- morphology, t.s. inte				
	strobilus, w.m. sporangiophore,w.r				
	dry)(temporary slides); t.s rhizome (pern	· ·			
	13. Pteris- morphology, t.s. rachis, sporangium, w.m. spores(temporary sl				
	prothallus with sex organs and youn				
	slide).	5 sporophyte (permanent			
	14. <i>Cycas</i> - morphology (coralloid roots,	, bulbil, leaf), t.s. coralloid			
	root, t.s. rachis, v.s. leaflet,v.s. micro				
	(temporary slides), l.s. ovule, t.s. root (p				
	15. Pinus- morphology (long and dwarf	· · · · · · · · · · · · · · · · · · ·			
	male and female), w.m.dwarf shoot, t.s.	needle, t.s. stem, , 1.s./t.s.			
	male cone, w.m. microsporophyll, w.m.				
	slides), l.s. female cone, t.l.s. &r.l.s. sten	n (permanent slide).			

Semes	ster II (AY 2020-2022)	Period:	to		
	: GE2T (Plant Ecology and Taxonomy)	Full Marks: 40		it: 04	
(Theo		Tull Marks. TO	Greu	ILI UT	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Introduction		(4	Dr. Nilay	
	Unit- 2: Ecological factors		lectures)	Kumar Maitra	
	Soil: Origin, formation, composition, so	oil profile. Water:			
	States of water in the environment, prec	ipitation types.			
	Light and temperature: Variation Optim	al and limiting			
	factors; Shelford law of tolerance. Adap	otation of			
	hydrophytes and xerophytes				
2	Unit -3: Plant communities		(2	Dr. Nilay Kumar	
	Characters; Ecotone and edge effect; Su	ccession; Processes	lectures)	Maitra	
	and types				
3	Unit- 4: Ecosystem		(4	Dr. Nilay Kumar	
	Structure; energy flow trophic organi		lectures)	Maitra	
	and food webs, Ecological pyrami				
	productivity; Bio-geochemical cycling	; Cycling of carbon,			
	nitrogen and Phosphorous			5 177	
4	Unit- 5: Phytogeography		(2	Dr. Nilay Kumar	
	Principle of Biogeographical zone; End		lectures)	Maitra	
5	Unit- 6: Introduction to plant taxono	•	(2	Susanta	
	Identification, Classification, Nomencla	iture.	lectures)	Kumar Maity	
6	Unit- 7: Identification		(2	Susanta	
	Functions of Herbarium, important herb	paria and hotanical	lectures)	Kumar	
	gardens of the world and India; Docume		lectures	Maity	
	Keys: single access and multi-access	,			
7	Unit 8: Taxonomic evidences from page 1	alvnology, cytology,	(2	Susanta	
	phytochemistry and molecular data.		lectures)	Kumar	
			ŕ	Maity	
8	Unit 9: Taxonomic hierarchy		(2	Susanta Kumar	
	Ranks, categories and taxonomic group	S	lectures)	Maity	
9	Unit 10: Botanical nomenclature		(4	Susanta	
-	Principles and rules (ICN); ranks and na	ames; binominal	lectures)	Kumar	
	system, typification, author citation, val			Maity	
	rejection of names, principle of priority				
10	Unit 11: Classification		(2	Susanta	
	Types of classification-artificial, natural	l and phylogenetic.	lectures)	Kumar	
	Bentham and Hooker (upto series), Eng	1 0	,	Maity	
	series).				
	Unit 12: Biometrics, numerical taxon	omy and cladistics	(2	Susanta	
	Characters; variations; OTUs, character	weighting and	lectures)	Kumar	
	coding; cluster analysis; phenograms, cl	ladograms		Maity	
	(definitions and differences).				

Seme	ster II (AY 2020-2022)	Period:	to		
Paper: GE2P (Plant Ecology and Taxonomy) Full		Full Marks: 20	Credi	t: 02	
(Pract	(Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure microclimatic variables: Soil thermometer, maximum and minimum thermometer, anemometer, psychrometer/hygrometer, rain gauge and lux meter.		(2 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH, and analysis of carbonates, chlorides, nitrates, sulphates base deficiency by rapid field test.		(3 lectures)	Dr. Nilay Kumar Maitra	
3	3. Comparison of bulk density, porosity infiltration of water in soil of three habit		(3 lectures)	Dr. Nilay Kumar Maitra	
4	4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (<i>Cuscuta</i>), Root parasite (<i>Orobanche</i>), Epiphytes, Predation (Insectivorous plants)			Susanta Kumar Maity	
	5. Determination of minimal quadrat size herbaceous vegetation in the college care curve method. (species to be listed)		(2 lectures)	Dr. Nilay Kumar Maitra	
	6. Quantitative analysis of herbaceous v college campus for frequency and comp Raunkiaer's frequency distribution law		(2 lectures)	Dr. Nilay Kumar Maitra	
	7. Study of vegetative and floral character families (Description, V.S. flower, section diagram/s, floral formula/e and systemate to Bentham & Hooker's system of classification):Brassicaceae - Brassica, A Asteraceae - Sonchus/Launaea, Vernonia Eclipta/Tridax; Solanaceae - Solanum ni Lamiaceae - Salvia, Ocimum; Liliaceae - / Allium.	on of ovary, floral tic position according Alyssum / Iberis; a/Ageratum, grum, Withania;	(8 lectures)	Susanta Kumar Maity	
	8. Mounting of a properly dried and pres wild plant with herbarium label (to be su book).	1	(4 lectures)	Sk Md Ismail Al Amin	

Semester III (AY 2020-2022) Period: to						
	: GE3T (Economic Botany and Plant F	40	Cred	dit: 04		
Biotec	hnology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Origin of Cultivated Plants: Concept	of centres o	f	(4	Dr. Nilay Kumar	
	origin, their importance with reference to V	/avilov's wor	k.	lectures)	Maitra	
2	Unit 2: Cereals: Wheat -Origin, morphology	, uses		(2	Dr. Nilay	
				lectures)	Kumar Maitra	
3	Unit 3: Legumes: General account with spec	cial referenc	e to	(2	Dr. Nilay	
	Gram and soybean			lectures)	Kumar Maitra	
4	Unit 4: Spices: General account with special	l reference to	o clove	(2	Dr. Nilay Kumar	
	and black pepper (Botanical name, family, p	oart used,		lectures)	Maitra	
	morphology and uses)					
5	U nit 5: Beverages :Tea (morphology, proce	ssing, uses)		(2	Dr. Nilay Kumar	
				lectures)	Maitra	
6	Unit 6: Oils and Fats: General description w	ith special		(2	Dr. Nilay Kumar	
	reference to groundnut			lectures)	Maitra	
7	Unit 7: Fibre Yielding Plants: General descri	ption with sp	pecial	(2	Dr. Nilay Kumar	
	reference to Cotton (Botanical name, family	y, part used,		lectures)	Maitra	
	morphology and uses)					
8	Unit 8: Introduction to biotechnology			(2	Susanta	
				lectures)	Kumar Maity	
9	Unit 9: Plant tissue culture: Micropropagati	on : hanloid		(8	Susanta	
	production through androgenesis and gyno	•	ef	lectures)	Kumar	
	account of embryo and endosperm culture	_		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Maity	
	applications.					
10	Unit 10: Recombinant DNA Techniques Blot	ting techniq	ues:	(10	Sk Md	
	Northern, Southern and Western Blotting, [DNA		lectures)	Ismail	
	Fingerprinting; Molecular DNA markers i.e.	RAPD, RFLP,	SNPs;		Al Amin	
	DNA sequencing, PCR and Reverse Transcrip				AIIIII	
	Hybridoma and monoclonal antibodies, ELIS					
	detection. Molecular diagnosis of human di	isease, Huma	an			
	gene Therapy					

Semester III (AY 2020-2022)		Period:	to		
Paper: GE3P (Economic Botany and Plant		Full Marks: 20	Credit	:02	
Biotec	hnology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of economically important plants Soybean, Black pepper, Clove Tea, Cotton	•	(6 lectures)	Dr. Nilay Kumar Maitra	
	specimens, sections and micro chemical t		,	Matua	
2	2. Familiarization with basic equipments i	n tissue culture.	(2 lectures)	Susanta Kumar Maity	
3	3. Study through photographs: Anther cul embryogenesis, endosperm and embryo omicropropagation.	•	(2 lectures)	Susanta Kumar Maity	
4	4. Study of molecular techniques: PCR, Bloand PAGE.	otting techniques, AGE	(4 lectures)	Sk Md Ismail Al Amin	

Semester III (AY 2020-2022)		Period:	to		
Paper: SEC1T (Biofertilizers) (Theory) Full Marks: 40		Cred	lit:04		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: General account about the microbe	s used as biofertilizer -	(40	Dr.Nilay	
	Rhizobium – isolation, identification, mass based inoculants, Actinorrhizal symbiosis.	s multiplication, carrier	lectures)	Kumar Maitra	
	Unit- 2: Azospirillum: isolation and mass	*			
	,	ect of different			
	microorganisms. Azotobacter: classification,				
	response to Azotobacter inoculum, m multiplication.	aintenance and mass			
	Unit- 3: Cyanobacteria (blue green algae),				
	azollae association, nitrogen fixation, factors	s affecting growth, blue			
	green algae and Azolla in rice cultivation.				
	Unit- 4: Mycorrhizal association, types of a taxonomy, occurrence and distribution, phos	•			
	and yield – colonization of VAM – isolation a				
	of VAM, and its influence on growth and yield				
	Unit-5: Organic farming – Green manuring				
	Recycling of biodegradable municipal, agr				
	wastes - biocompost making methods,	types and method of			
	vermicomposting – field Application.				

Seme	Semester IV (AY 2020-2022) Period: to				
Paper	Paper: GE4T (Plant Anatomy and Full Marks: 40 Credit:04		lit:04		
Embryology) (Theory)					
Sl. No.	TOPICS		CLASSES	Class	Remark
1	Unit 1: Meristematic and permanent	ticcuoc	ALLOTED (2	taken by Susanta	
1	Root and shoot apical meristems; Simple		lectures)	Kumar	
	tissues	c and complex	lectures	Maity	
2	U nit 2: Organs		(4	Susanta	
_	Structure of dicot and monocot root sten	n and leaf.	lectures)	Kumar Maity	
3	Unit 3: Secondary Growth		(4	Susanta	
3	Vascular cambium – structure and funct	ion, seasonal activity.	lectures)	Kumar Maity	
	Secondary growth in root and stem, W		lectures,	Maily	
	sapwood)	(110011) 000 0110			
4	Unit 4: Adaptive and protective system	ns	(4	Susanta	
	Epidermis, cuticle, stomata; General ac		lectures)	Kumar Maity	
	in xerophytes and hydrophytes.	•			
5	Unit 5: Structural organization of flow	ver	(4	Susanta Kumar	
	Structure of anther and pollen; Structure	e and types of ovules;	lectures)	Maity	
	Types of embryo sacs, organization and	ultrastructure of			
	mature embryo sac.				
6	Unit 6: Pollination and fertilization		(4	Susanta Kumar	
	Pollination mechanisms and adaptations		lectures)	Maity	
	fertilization; Seed-structure appendages	and dispersal			
	mechanisms.				
7	Unit 7: Embryo and endosperm		(4	Susanta	
	Endosperm types, structure and function	s; Dicot and	lectures)	Kumar Maity	
	monocot embryo; Embryo endosperm re		,	1.1411,	
	Unit 8: Apomixis and polyembryony	•	(4	Susanta	
	Definition, types and Practical application	ons	lectures)	Kumar Maity	

Semester IV (AY 2020-2022) Period:					
_	Paper: GE4P (Plant Anatomy and Full Marks: 20			lit: 02	
Embr	yology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of meristems through pe photographs.		(1 lectures)	Susanta Kumar Maity	
2	2. Tissues (parenchyma, collenchyma ar Macerated xylary elements, Phloem (Perphotographs)	rmanent slides,	(1 lectures)	Susanta Kumar Maity	
3	3. Stem: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
4	4. Root: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	· · · · · · · · · · · · · · · · · · ·	(1 lectures)	Susanta Kumar Maity	
5	5. Leaf: Dicot and Monocot leaf (only P		(1 lectures)	Susanta Kumar Maity	
6	6. Adaptive anatomy: Xerophyte (<i>Nerial (Hydrilla</i> stem).	um leaf); Hydrophyte	(2 lectures)	Susanta Kumar Maity	
7	7. Structure of anther (young and mature), tapetum (amoeboid and secretory) (Permanent slides).		(1 lectures)	Susanta Kumar Maity	
8	8. Types of ovules: anatropous, orthotro amphitropous/ campylotropous.	opous, circinotropous,	(1 lectures)	Susanta Kumar Maity	
9	9. Female gametophyte: <i>Polygonum</i> (mo Embryo sac Development (Permanent sl	ides/photographs).	(1 lectures)	Susanta Kumar Maity	
10	10. Ultrastructure of mature egg apprelectron micrographs.		(1 lectures)	Susanta Kumar Maity	
11	11. Pollination types and seed di (including appendages, aril, caruncle specimens).		(1 lectures)	Susanta Kumar Maity	
12	12. Dissection of embryo/endosperm fro		(1 lectures)	Susanta Kumar Maity	
13	13. Calculation of percentage of germin medium.	ated pollen in a given	(1 lectures)	Susanta Kumar Maity	

Seme	ster IV (AY 2020-2022)	Period:	to		
Paper	: SEC2T (Mushroom	Full Marks: 40	Cre	edit:04	
Cultu	reTechnology) (Theory)				
Sl. No.			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.			Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology: Infrastruc available) Polythene bag, vessels, Inoculation			Dr.Nilay Kumar Maitra	

	low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.		
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral	Dr.Nilay Kumar Maitra	
4	elements nutrition - Carbohydrates, Crude fibre content - Vitamins. Unit 4: Food Preparation: Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra	

		GENERAL; CBCS)			
	ster I (AY 2019-2021)		to		
Paper	: GE1T (Biodiversity (Microbes, Algae,	Full Marks: 40	Credi	t: 04	
Fungi	and Archegoniate)) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Microbes		(12	Sk Md	
-	Viruses – Discovery, general structure,	replication (general	lectures)	Ismail Al Amin	
	account), DNA virus (T-phage); Lytic a		lectures	Amin	
	RNA virus (TMV); Economic importan				
	Discovery, General characteristics and o				
	Reproduction – vegetative, asexual and				
	(conjugation, transformation and trans				
	importance.	,,			
2	Unit 2: Algae		(10	Susanta	
_	General characteristics; Ecology and dis	stribution: Range of	lectures)	Kumar	
	thallus organization and reproduction; (,	lectures	Maity	
	Morphology and life-cycles of the follo				
	Chlamydomonas, Oedogonium, Vauche	•			
	Polysiphonia. Economic importance of				
3	Unit 3: Fungi	<u> </u>	(10	Dr. Nilay	
-	Introduction- General characteris	tics, ecology and	lectures)	Kumar Maitra	
	significance, range of thallus org	, C3	,	iviaitia	
	composition, nutrition, reproduction as				
	Fungi- General characteristics, ecology and significance, life				
	cycle of Rhizopus (Zygomycota)				
	(Ascomycota), Puccinia, Agarici				
	Symbiotic Associations-Lichens:	General account,			
	reproduction and significance; Mycor				
	and endomycorrhiza and their significan	nce.			
4	Unit 4: Introduction to Archegoniate		(10	Sk Md Ismail Al	
	Unifying features of archegoniates, Tr	ansition to land habit,	lectures)	Amin	
	Alternation of generations.				
5	Unit 5: Bryophytes				
	General characteristics, adaptation	s to land habit,			
	Classification, Range of thallus				
	organization.Classification (up to				
	anatomy and reproduction of				
	Funaria.(Developmental details not to	,			
	and economic importance of bryophyte	s with special mention			
<i>C</i>	of Sphagnum.		/10	Susanta	
6	Unit 6: Pteridophytes	n Forty land plants	(10	Kumar	
	General characteristics, classificatio (Cooksonia and Rhynia). Classification		lectures)	Maity	
	morphology, anatomy and reprodu				
	Equisetum and Pteris. (Development				
	included).Heterospory and seed ha				
	Ecological and economical importance				
	2501051car and coordinate importance	of iteliacpity tos.			
7	Unit 7: Gymnosperms		(4	Susanta	
-	General characteristics; Classification (up to family),	lectures)	Kumar	
	morphology, anatomy and reproduction	• / ·		Maity	
	(Developmental details not to be include				
	economical importance.				

Samas	ster I (AY 2019-2021)	Period: to			
	: GE1P (Biodiversity (Microbes, Algae,	Full Marks: 20	Credit: 0	2	
_	and Archegoniate)) (Practical)	Tuli Marks. 20	Greatt. O.	4	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	 EMs/Models of viruses – T-Phage and TMV, Line drawing/Photograph of Lytic and Lysogenic Cycle. Types of Bacteria from temporary/permanent slides/photographs; EM bacterium; Binary Fission; Conjugation; Structure of root nodule. Gram staining 			Sk Md Ismail Al Amin	
2	3. Study of vegetative and reproduct <i>Chlamydomonas</i> (electron micrographs) <i>Fucus* and Polysiphonia</i> through tempermanent slides. (* <i>Fucus</i> - Specimen a	, Oedogonium, Vaucheria, mporary preparations and	(6 lectures)	Susanta Kumar Maity	
3	4. Rhizopus and Penicillium: Asexus mounts and sexual Structures through per 5. Alternaria: Specimens/photographs a 6. Puccinia: Herbarium specimens of E and infected Barberryleaves; section/te Wheat and permanent slides of both the 7. Agaricus: Specimens of button stage Sectioning of gills of Agaricus. 8. Lichens: Study of growth forms of lich fruticose) 9. Mycorrhiza: ecto mycorrhiza (Photographs)	ermanent slides. Ind tease mounts. Black Stem Rust of Wheat ease mounts of spores on hosts. Indicate the spores on the spores on the stem of the spores on the spores of the spores o	(6 lectures)	Dr. Nilay Kumar Maitra	
4	10. <i>Marchantia</i> - morphology of thallus v.s. thallus through gemmacup, w.m. slides), v.s. antheridiophore, archegonic permanent slides). 11. <i>Funaria</i> - morphology, w.m. le peristome, annulus, spores(temporary showing antheridial and archegonial protonema.	af, rhizoids, operculum, slides); permanent slides	(4 lectures)	Sk Md Ismail Al Amin	
	12. Selaginella- morphology, w.m. leaf strobilus, w.m.microsporophyll and m slides), l.s. strobilus (permanent slide). 14. Equisetum- morphology, t.s. intestrobilus, w.m. sporangiophore, w. intestrobilus, v. inte	ernode, l.s. strobilus, t.s. m. spores (wet and manent slide). , v.s. sporophyll, w.m. lides), t.s. rhizome, w.m. g sporophyte (permanent osporophyll, w.m. spores ermanent slide). shoots, w.m. dwarf shoot, needle, t.s. stem, , l.s./t.s. microspores (temporary	(6 lectures)	Susanta Kumar Maity	

Semes	ster II (AY 2019-2021)	Period:	to		
	: GE2T (Plant Ecology and Taxonomy)	Full Marks: 40		it: 04	
(Theo		Tull Marks. 10	Grea	10. 01	
Sl. No.	TOPICS	<u> </u>	CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Introduction		(4	Dr. Nilay	
	Unit- 2: Ecological factors		lectures)	Kumar Maitra	
	Soil: Origin, formation, composition, soil profile. Water:				
	States of water in the environment, prec	ripitation types.			
	Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of				
	hydrophytes and xerophytes				
2	Unit -3: Plant communities		(2	Dr. Nilay	
	Characters; Ecotone and edge effect; Succession; Processes		lectures)	Kumar Maitra	
	and types		Í		
3	Unit- 4: Ecosystem		(4	Dr. Nilay	
	Structure; energy flow trophic organi	sation; Food chains	lectures)	Kumar Maitra	
	and food webs, Ecological pyrami				
	productivity; Bio-geochemical cycling	; Cycling of carbon,			
	nitrogen and Phosphorous				
4	Unit- 5: Phytogeography		(2	Dr. Nilay Kumar	
	Principle of Biogeographical zone; End	emism.	lectures)	Maitra	
5	Unit- 6: Introduction to plant taxono	omy	(2	Susanta	
	Identification, Classification, Nomencla	ature.	lectures)	Kumar	
6	Unit- 7: Identification		(2	Maity Susanta	
O	Functions of Herbarium, important herb	paria and hotonical	lectures)	Kumar	
	gardens of the world and India; Docume		lectures)	Maity	
	Keys: single access and multi-access	chianon. Piora,			
7	Unit 8 : Taxonomic evidences from pa	alvnology cytology	(2	Susanta	
,	phytochemistry and molecular data.	arymology, cytology,	lectures)	Kumar	
	phytoenemistry and morecular data.		icctures	Maity	
8	Unit 9: Taxonomic hierarchy		(2	Susanta	
	Ranks, categories and taxonomic group	S	lectures)	Kumar	
9	Unit 10: Botanical nomenclature		(4	Maity Susanta	
,	Principles and rules (ICN); ranks and na	ames: hinominal	lectures)	Kumar	
	system, typification, author citation, val		icciui E3)	Maity	
	rejection of names, principle of priority	*			
10	Unit 11: Classification	and no minumons.	(2	Susanta	
-0	Types of classification-artificial, natural	l and phylogenetic	lectures)	Kumar	
	Bentham and Hooker (upto series), Eng	1		Maity	
	series).	(
	Unit 12: Biometrics, numerical taxon	omy and cladistics	(2	Susanta	
	Characters; variations; OTUs, character	•	lectures)	Kumar	
	coding; cluster analysis; phenograms, cl			Maity	
	(definitions and differences).	5			
			I		1

Semes	ster II (AY 2019-2021)	Period:	to		
	: GE2P (Plant Ecology and Taxonomy)	Full Marks: 20	Credi	t: 02	
(Pract	tical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure variables: Soil thermometer, maximum a thermometer, anemometer, psychrometer gauge and lux meter.	and minimum	(2 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH, and analysis of carbonates, chlorides, nitrates, sulphates base deficiency by rapid field test.	*	(3 lectures)	Dr. Nilay Kumar Maitra	
3	3. Comparison of bulk density, porosity infiltration of water in soil of three habit		(3 lectures)	Dr. Nilay Kumar Maitra	
4	4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (<i>Cuscuta</i>), Root parasite (<i>Orobanche</i>), Epiphytes, Predation (Insectivorous plants)			Susanta Kumar Maity	
	5. Determination of minimal quadrat size herbaceous vegetation in the college care curve method. (species to be listed)	•	(2 lectures)	Dr. Nilay Kumar Maitra	
	6. Quantitative analysis of herbaceous v college campus for frequency and comp Raunkiaer's frequency distribution law		(2 lectures)	Dr. Nilay Kumar Maitra	
	7. Study of vegetative and floral character families (Description, V.S. flower, section diagram/s, floral formula/e and systemate to Bentham & Hooker's system of classification):Brassicaceae - Brassica, Asteraceae - Sonchus/Launaea, Vernonia Eclipta/Tridax; Solanaceae - Solanum ni Lamiaceae - Salvia, Ocimum; Liliaceae - / Allium.	on of ovary, floral tic position according Alyssum / Iberis; a/Ageratum, grum, Withania;	(8 lectures)	Susanta Kumar Maity	
	8. Mounting of a properly dried and preswild plant with herbarium label (to be subook).	•	(4 lectures)	Sk Md Ismail Al Amin	

Semes		eriod:		to		
		ull Marks:	40	Cred	dit: 04	
Biotec	hnology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Origin of Cultivated Plants: Concept of centres of		(4	Dr. Nilay Kumar		
	origin, their importance with reference to V	/avilov's wor	k.	lectures)	Maitra	
2	Unit 2: Cereals: Wheat -Origin, morphology,	, uses		(2	Dr. Nilay	
				lectures)	Kumar Maitra	
3	Unit 3: Legumes: General account with spec	cial reference	e to	(2	Dr. Nilay	
	Gram and soybean			lectures)	Kumar Maitra	
4	Unit 4: Spices: General account with special	reference to	clove	(2	Dr. Nilay Kumar	
	and black pepper (Botanical name, family, p	oart used,		lectures)	Maitra	
	morphology and uses)					
5	U nit 5: Beverages :Tea (morphology, proces	ssing, uses)		(2	Dr. Nilay Kumar	
				lectures)	Maitra	
6	Unit 6: Oils and Fats: General description wi	ith special		(2	Dr. Nilay Kumar	
	reference to groundnut			lectures)	Maitra	
7	Unit 7: Fibre Yielding Plants: General descrip	ption with sp	ecial	(2	Dr. Nilay Kumar	
	reference to Cotton (Botanical name, family	y, part used,		lectures)	Maitra	
	morphology and uses)					
8	Unit 8: Introduction to biotechnology			(2	Susanta	
				lectures)	Kumar Maity	
9	Unit 9: Plant tissue culture: Micropropagation	on : hanloid		(8	Susanta	
	production through androgenesis and gynog	•	f	lectures)	Kumar	
	account of embryo and endosperm culture	_		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	Maity	
	applications.					
10	Unit 10: Recombinant DNA Techniques Blot	ting techniq	ues:	(10	Sk Md	
	Northern, Southern and Western Blotting, [ONA		lectures)	Ismail	
	Fingerprinting; Molecular DNA markers i.e.	RAPD, RFLP,	SNPs;		Al Amin	
	DNA sequencing, PCR and Reverse Transcrip	ptase-PCR.			Allilli	
	Hybridoma and monoclonal antibodies, ELIS	SA and Immu	ino			
	detection. Molecular diagnosis of human di	sease, Huma	ın			
	gene Therapy					

Semester III (AY 2019-2021)		Period:	to		
Paper	: GE3P (Economic Botany and Plant	Full Marks: 20	Credit	:02	
Biotechnology) (Practical)					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of economically important plants Soybean, Black pepper, Clove Tea, Cotton specimens, sections and micro chemical t	, Groundnut through	(6 lectures)	Dr. Nilay Kumar Maitra	
2	2. Familiarization with basic equipments i	n tissue culture.	(2 lectures)	Susanta Kumar Maity	
3	3. Study through photographs: Anther cul embryogenesis, endosperm and embryo omicropropagation.	•	(2 lectures)	Susanta Kumar Maity	
4	4. Study of molecular techniques: PCR, Bloand PAGE.	otting techniques, AGE	(4 lectures)	Sk Md Ismail Al Amin	

Semester III (AY 2019-2021)		Period:	to		
Paper: SEC1T (Biofertilizers) (Theory) Fi		Full Marks: 40	Cred	lit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: General account about the microbe	s used as biofertilizer -	(40	Dr.Nilay	
	Rhizobium – isolation, identification, mass based inoculants, Actinorrhizal symbiosis.	s multiplication, carrier	lectures)	Kumar Maitra	
	Unit- 2: Azospirillum: isolation and mass	*			
	,	ect of different			
	microorganisms. Azotobacter: classification,				
	response to Azotobacter inoculum, m multiplication.	aintenance and mass			
	Unit- 3: Cyanobacteria (blue green algae),				
	azollae association, nitrogen fixation, factors	s affecting growth, blue			
	green algae and Azolla in rice cultivation.				
	Unit- 4: Mycorrhizal association, types of a taxonomy, occurrence and distribution, phos	•			
	and yield – colonization of VAM – isolation a				
	of VAM, and its influence on growth and yield				
	Unit-5: Organic farming – Green manuring				
	Recycling of biodegradable municipal, agr				
	wastes - biocompost making methods,	types and method of			
	vermicomposting – field Application.				

Seme	Semester IV (AY 2019-2021) Period: to				
Paper	: GE4T (Plant Anatomy and	Full Marks: 40	Credit:04		
Embr	yology) (Theory)				
Sl. No.	TOPICS		CLASSES	Class	Remark
1	Unit 1: Meristematic and permanent tissues		ALLOTED (2	taken by Susanta	
1	Root and shoot apical meristems; Simple		lectures)	Kumar	
	tissues	c and complex	lectures	Maity	
2	U nit 2: Organs		(4	Susanta	
_	Structure of dicot and monocot root sten	n and leaf.	lectures)	Kumar Maity	
3	Unit 3: Secondary Growth		(4	Susanta	
	Vascular cambium – structure and funct	ion, seasonal activity.	lectures)	Kumar Maity	
	Secondary growth in root and stem, W		lectures,	Maily	
	sapwood)	(110011) 000 0110			
4	Unit 4: Adaptive and protective system	ns	(4	Susanta	
	Epidermis, cuticle, stomata; General ac		lectures)	Kumar Maity	
	in xerophytes and hydrophytes.	1	,	1.11111	
5	Unit 5: Structural organization of flow	ver	(4	Susanta Kumar	
	Structure of anther and pollen; Structure	e and types of ovules;	lectures)	Maity	
	Types of embryo sacs, organization and	ultrastructure of			
	mature embryo sac.				
6	Unit 6: Pollination and fertilization		(4	Susanta Kumar	
	Pollination mechanisms and adaptations		lectures)	Maity	
	fertilization; Seed-structure appendages	and dispersal			
	mechanisms.				
7	Unit 7: Embryo and endosperm		(4	Susanta	
	Endosperm types, structure and function	s; Dicot and	lectures)	Kumar Maity	
	monocot embryo; Embryo endosperm re		,	1.1411,	
	Unit 8: Apomixis and polyembryony	•	(4	Susanta	
	Definition, types and Practical application	ons	lectures)	Kumar Maity	

Semes	ster IV (AY 2019-2021)	Period:	to		
	: GE4P (Plant Anatomy and	Full Marks: 20	Cred	lit: 02	
Embry	yology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of meristems through pe photographs.		(1 lectures)	Susanta Kumar Maity	
2	2. Tissues (parenchyma, collenchyma ar Macerated xylary elements, Phloem (Perphotographs)	rmanent slides,	(1 lectures)	Susanta Kumar Maity	
3	3. Stem: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
4	4. Root: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
5	5. Leaf: Dicot and Monocot leaf (only P	,	(1 lectures)	Susanta Kumar Maity	
6	6. Adaptive anatomy: Xerophyte (<i>Neria</i> (<i>Hydrilla</i> stem).	um leaf); Hydrophyte	(2 lectures)	Susanta Kumar Maity	
7	7. Structure of anther (young and (amoeboid and secretory) (Permanent sl.		(1 lectures)	Susanta Kumar Maity	
8	8. Types of ovules: anatropous, orthotro amphitropous/ campylotropous.	pous, circinotropous,	(1 lectures)	Susanta Kumar Maity	
9	9. Female gametophyte: <i>Polygonum</i> (mo Embryo sac Development (Permanent sl		(1 lectures)	Susanta Kumar Maity	
10	10. Ultrastructure of mature egg app electron micrographs.	aratus cells through	(1 lectures)	Susanta Kumar Maity	
11	11. Pollination types and seed di (including appendages, aril, caruncle specimens).	(Photographs and	(1 lectures)	Susanta Kumar Maity	
12	12. Dissection of embryo/endosperm fro		(1 lectures)	Susanta Kumar Maity	
13	13. Calculation of percentage of germin medium.	ated pollen in a given	(1 lectures)	Susanta Kumar Maity	

Seme	ster IV (AY 2019-2021)	Period:	to		
Paper	: SEC2T (Mushroom	Full Marks: 40	Cre	dit:04	
Cultu	reTechnology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional a edible mushrooms; Poisonous mushrooms. Ty available in India - <i>Volvariellavolvacea</i> , <i>Agaricusbisporus</i> .	pes of edible mushrooms		Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology: Infrastruction available) Polythene bag, vessels, Inoculation low cost stove, sieves, culture rack, mushroo water sprayer, tray, small polythene bag, sterilization, preparation of spawn, multiple preparation - paddy straw, sugarcane trasseleaves. Factors affecting the mushroom bed technology, Composting technology in mushroom.	h hook, inoculation loop, m unit (Thatched house) Pure culture: Medium, ication. Mushroom bed h, maize straw, banana preparation - Low cost		Dr.Nilay Kumar Maitra	
3	Unit 3: Storage and nutrition: Short-term upto 24 hours) Long term Storage (canning, storage in saltsolutions. Nutrition - Proteins elements nutrition - Carbohydrates, Crude fibr	storage (Refrigeration - pickels, papads), drying, - amino acids, mineral		Dr.Nilay Kumar Maitra	
4	Unit 4: Food Preparation: Types of foods prep mushroom.Research Centres - National level a benefit ratio - Marketing in India and abroad,	and Regional level.Cost		Dr.Nilay Kumar Maitra	

		GENERAL; CBCS)			
	ster I (AY 2018-2020)		to		
Paper	: GE1T (Biodiversity (Microbes, Algae,	Full Marks: 40	Credi	t: 04	
Fungi	and Archegoniate)) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Microbes		(12	Sk Md	
-	Viruses – Discovery, general structure,	replication (general	lectures)	Ismail Al Amin	
	account), DNA virus (T-phage); Lytic a		lectures	Amin	
	RNA virus (TMV); Economic importan				
	Discovery, General characteristics and o				
	Reproduction – vegetative, asexual and				
	(conjugation, transformation and trans				
	importance.	,,			
2	Unit 2: Algae		(10	Susanta	
_	General characteristics; Ecology and dis	stribution: Range of	lectures)	Kumar	
	thallus organization and reproduction; (,	lectures	Maity	
	Morphology and life-cycles of the follo				
	Chlamydomonas, Oedogonium, Vauche	•			
	Polysiphonia. Economic importance of				
3	Unit 3: Fungi	<u> </u>	(10	Dr. Nilay	
-	Introduction- General characteris	tics, ecology and	lectures)	Kumar Maitra	
	significance, range of thallus org	, C3	,	iviaitia	
	composition, nutrition, reproduction as				
	Fungi- General characteristics, ecology and significance, life				
	cycle of Rhizopus (Zygomycota)				
	(Ascomycota), Puccinia, Agarici				
	Symbiotic Associations-Lichens:	General account,			
	reproduction and significance; Mycor				
	and endomycorrhiza and their significan	nce.			
4	Unit 4: Introduction to Archegoniate		(10	Sk Md Ismail Al	
	Unifying features of archegoniates, Tr	ansition to land habit,	lectures)	Amin	
	Alternation of generations.				
5	Unit 5: Bryophytes				
	General characteristics, adaptation	s to land habit,			
	Classification, Range of thallus				
	organization.Classification (up to				
	anatomy and reproduction of				
	Funaria.(Developmental details not to	,			
	and economic importance of bryophyte	s with special mention			
<i>C</i>	of Sphagnum.		/10	Susanta	
6	Unit 6: Pteridophytes	n Forty land plants	(10	Kumar	
	General characteristics, classificatio (Cooksonia and Rhynia). Classification		lectures)	Maity	
	morphology, anatomy and reprodu				
	Equisetum and Pteris. (Development				
	included).Heterospory and seed ha				
	Ecological and economical importance				
	2501051car and coordinate importance	of it torrate print too.			
7	Unit 7: Gymnosperms		(4	Susanta	
-	General characteristics; Classification (up to family),	lectures)	Kumar	
	morphology, anatomy and reproduction	• / ·		Maity	
	(Developmental details not to be include	· ·			
	economical importance.				

Samas	ster I (AY 2018-2020)	Period: to			
	: GE1P (Biodiversity (Microbes, Algae,	Full Marks: 20	Credit: 0	2	
_	and Archegoniate)) (Practical)	run Marks. 20	Creuit. U	L	
Sl. No.	TOPICS		CLASSES	Class	Remark
	101100		ALLOTED	taken by	11011101111
1	1. EMs/Models of viruses – T-F	•	(4	Sk Md Ismail Al	
	drawing/Photograph of Lytic and Lysog		lectures)	Amin	
	2. Types of Bacteria from temporary/per	manent slides/			
	photographs; EM bacterium; Binary	1 1			
	Fission; Conjugation; Structure of root	nodule.			
2	3. Gram staining3. Study of vegetative and reproduct	ive structures of Mostos	(6	Susanta	
	Chlamydomonas (electron micrographs)		lectures)	Kumar	
	Fucus* and Polysiphonia through ter	lectures)	Maity		
	permanent slides. (* Fucus - Specimen a				
3	4. Rhizopus and Penicillium: Asexus		(6	Dr. Nilay	
	mounts and sexual Structures through pe		lectures)	Kumar Maitra	
	5. Alternaria: Specimens/photographs at		,	iviaitia	
	6. <i>Puccinia</i> : Herbarium specimens of E				
	and infected Barberryleaves; section/te	ease mounts of spores on			
	Wheat and permanent slides of both the				
	7. Agaricus: Specimens of button stage	and full grown mushroom;			
	Sectioning of gills of Agaricus.				
	8. Lichens: Study of growth forms of lic	hens (crustose, foliose and			
	fruticose)	1 1 1'			
	9. Mycorrhiza: ecto mycorrhiza	and endo mycorrhiza			
4	(Photographs) 10. <i>Marchantia</i> - morphology of thallus.	wm rhizoids and scales	(4	Sk Md	
T	v.s. thallus through gemmacup, w.m.		lectures)	Ismail Al	
	slides), v.s. antheridiophore, archegonic		lectures	Amin	
	permanent slides).	· · · · · · · · · · · · · · · · · · ·			
	11. Funaria- morphology, w.m. le	af, rhizoids, operculum,			
	peristome, annulus, spores(temporary	-			
	showing antheridial and archegonial	heads, l.s. capsule and			
	protonema.				
	12. Selaginella- morphology, w.m. leaf	O 1	(6	Susanta	
	strobilus, w.m.microsporophyll and m	egasporophyll (temporary	lectures)	Kumar Maity	
	slides), l.s. strobilus (permanent slide).	1 1 4 19 4		1,1411,	
	14. Equisetum- morphology, t.s. inte				
	strobilus, w.m. sporangiophore,w.i dry)(temporary slides); t.s rhizome (perr				
	13. Pteris- morphology, t.s. rachis	,			
	sporangium, w.m. spores(temporary s				
	prothallus with sex organs and youn				
	slide).	o skorobulto (bermanent			
	14. <i>Cycas</i> - morphology (coralloid roots,	bulbil, leaf), t.s. coralloid			
	root, t.s. rachis, v.s. leaflet,v.s. micro	· · · · · · · · · · · · · · · · · · ·			
	(temporary slides), l.s. ovule, t.s. root (p				
	15. Pinus- morphology (long and dwarf	shoots, w.m. dwarf shoot,			
	male and female), w.m.dwarf shoot, t.s.				
	male cone, w.m. microsporophyll, w.m.				
	slides), l.s. female cone, t.l.s. &r.l.s. sten	n (permanent slide).			

Somo	ster II (AY 2018-2020)	Period:	to		
	·	Full Marks: 40	to	it: 04	
_	: GE2T (Plant Ecology and Taxonomy)	Full Marks: 40	Crea	II: U4	
(Theo	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: Introduction Unit- 2: Ecological factors Soil: Origin, formation, composition, so States of water in the environment, pred Light and temperature: Variation Optim	cipitation types.	(4 lectures)	Dr. Nilay Kumar Maitra	
	factors; Shelford law of tolerance. Adap hydrophytes and xerophytes	_			
2	Unit -3: Plant communities Characters; Ecotone and edge effect; Su and types	accession; Processes	(2 lectures)	Dr. Nilay Kumar Maitra	
3	Unit- 4: Ecosystem Structure; energy flow trophic organiand food webs, Ecological pyramic productivity; Bio-geochemical cycling nitrogen and Phosphorous	ids production and	(4 lectures)	Dr. Nilay Kumar Maitra	
4	Unit- 5: Phytogeography Principle of Biogeographical zone; End	emism.	(2 lectures)	Dr. Nilay Kumar Maitra	
5	Unit- 6: Introduction to plant taxono Identification, Classification, Nomencla	•	(2 lectures)	Susanta Kumar Maity	
6	Unit- 7: Identification Functions of Herbarium, important herbardens of the world and India; Docum Keys: single access and multi-access		(2 lectures)	Susanta Kumar Maity	
7	Unit 8: Taxonomic evidences from p phytochemistry and molecular data.	alynology, cytology,	(2 lectures)	Susanta Kumar Maity	
8	Unit 9: Taxonomic hierarchy Ranks, categories and taxonomic group	s	(2 lectures)	Susanta Kumar Maity	
9	Unit 10: Botanical nomenclature Principles and rules (ICN); ranks and not system, typification, author citation, value rejection of names, principle of priority	lid publication,	(4 lectures)	Susanta Kumar Maity	
10	Unit 11: Classification Types of classification-artificial, natura Bentham and Hooker (upto series), Eng series).		(2 lectures)	Susanta Kumar Maity	
	Unit 12: Biometrics, numerical taxon Characters; variations; OTUs, character coding; cluster analysis; phenograms, c (definitions and differences).	weighting and	(2 lectures)	Susanta Kumar Maity	

Seme	ster II (AY 2018-2020)	Period:	to		
Paper	:: GE2P (Plant Ecology and Taxonomy)	Full Marks: 20	Credi	t: 02	
(Pract	tical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure variables: Soil thermometer, maximum a thermometer, anemometer, psychrometer gauge and lux meter.	and minimum	(2 lectures)	Dr. Nilay Kumar Maitra	
2	2. Determination of pH, and analysis of carbonates, chlorides, nitrates, sulphates base deficiency by rapid field test.		(3 lectures)	Dr. Nilay Kumar Maitra	
3	3. Comparison of bulk density, porosity infiltration of water in soil of three habit	tats.	(3 lectures)	Dr. Nilay Kumar Maitra	
4	4. (a) Study of morphological adaptation xerophytes (four each). (b)Study of biot following: Stem parasite (<i>Cuscuta</i>), Roc (<i>Orobanche</i>), Epiphytes, Predation (Inse	ic interactions of the ot parasite	(4 lectures)	Susanta Kumar Maity	
	5. Determination of minimal quadrat size herbaceous vegetation in the college care curve method. (species to be listed)		(2 lectures)	Dr. Nilay Kumar Maitra	
	6. Quantitative analysis of herbaceous v college campus for frequency and comp Raunkiaer's frequency distribution law		(2 lectures)	Dr. Nilay Kumar Maitra	
	7. Study of vegetative and floral character families (Description, V.S. flower, section diagram/s, floral formula/e and systemate to Bentham & Hooker's system of classification):Brassicaceae - Brassica, A Asteraceae - Sonchus/Launaea, Vernonia Eclipta/Tridax; Solanaceae - Solanum ni Lamiaceae - Salvia, Ocimum; Liliaceae - / Allium.	on of ovary, floral tic position according Alyssum / Iberis; a/Ageratum, grum, Withania;	(8 lectures)	Susanta Kumar Maity	
	8. Mounting of a properly dried and preswild plant with herbarium label (to be subook).	1	(4 lectures)	Sk Md Ismail Al Amin	

Semes		eriod:		to		
Paper	: GE3T (Economic Botany and Plant F	ull Marks:	40	Cred	dit: 04	
Biotec	hnology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Origin of Cultivated Plants: Concept	of centres of	f	(4	Dr. Nilay Kumar	
	origin, their importance with reference to V	/avilov's wor	k.	lectures)	Maitra	
2	Unit 2: Cereals: Wheat -Origin, morphology,	, uses		(2	Dr. Nilay	
				lectures)	Kumar Maitra	
3	Unit 3: Legumes: General account with spec	cial reference	e to	(2	Dr. Nilay	
	Gram and soybean			lectures)	Kumar Maitra	
4	Unit 4: Spices: General account with special	l reference to	clove	(2	Dr. Nilay	
	and black pepper (Botanical name, family, p	oart used,		lectures)	Kumar Maitra	
	morphology and uses)					
5	U nit 5: Beverages :Tea (morphology, proce	ssing, uses)		(2	Dr. Nilay Kumar	
				lectures)	Maitra	
6	Unit 6: Oils and Fats: General description wi	ith special		(2	Dr. Nilay Kumar	
	reference to groundnut			lectures)	Maitra	
7	Unit 7: Fibre Yielding Plants: General descrip	ption with sp	ecial	(2	Dr. Nilay Kumar	
	reference to Cotton (Botanical name, family	y, part used,		lectures)	Maitra	
	morphology and uses)					
8	Unit 8: Introduction to biotechnology			(2	Susanta	
				lectures)	Kumar Maity	
9	Unit 9: Plant tissue culture: Micropropagation	on · hanloid		(8	Susanta	
´	production through androgenesis and gyno	•	f	lectures)	Kumar	
	account of embryo and endosperm culture	_	•	rectures,	Maity	
	applications.					
10	Unit 10: Recombinant DNA Techniques Blot	ting techniq	ues:	(10	Sk Md	
	Northern, Southern and Western Blotting, D			lectures)	Ismail	
	Fingerprinting; Molecular DNA markers i.e.		SNPs;	,	Al Amin	
	DNA sequencing, PCR and Reverse Transcrip				Amin	
	Hybridoma and monoclonal antibodies, ELIS	SA and Immu	ino			
	detection. Molecular diagnosis of human di	isease, Huma	ın			
	gene Therapy					

Semes	ster III (AY 2018-2020)	Period:	to		
Paper	: GE3P (Economic Botany and Plant	Full Marks: 20	Credit	:02	
Biotec	hnology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of economically important plants Soybean, Black pepper, Clove Tea, Cotton specimens, sections and micro chemical t	, Groundnut through	(6 lectures)	Dr. Nilay Kumar Maitra	
2	2. Familiarization with basic equipments i		(2 lectures)	Susanta Kumar Maity	
3	3. Study through photographs: Anther cul embryogenesis, endosperm and embryo omicropropagation.	•	(2 lectures)	Susanta Kumar Maity	
4	4. Study of molecular techniques: PCR, Bloand PAGE.	otting techniques, AGE	(4 lectures)	Sk Md Ismail Al Amin	

Semes	ster III (AY 2018-2020)	Period:	to		
Paper	: SEC1T (Biofertilizers) (Theory)	Full Marks: 40	Cred	lit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: General account about the microbe		(40	Dr.Nilay Kumar	
	Rhizobium – isolation, identification, mass based inoculants, Actinorrhizal symbiosis.	s munipheation, carrier	lectures)	Maitra	
	Unit- 2: Azospirillum: isolation and mass	1			
	based inoculant, associative eff microorganisms. Azotobacter: classification,	ect of different characteristics – crop			
	response to Azotobacter inoculum, m	*			
	multiplication.	. 11 1 . 1			
	Unit- 3: Cyanobacteria (blue green algae), azollae association, nitrogen fixation, factors				
	green algae and Azolla in rice cultivation.	s affecting growth, olde			
	Unit- 4: Mycorrhizal association, types of	•			
	taxonomy, occurrence and distribution, phos				
	and yield – colonization of VAM – isolation a of VAM, and its influence on growth and yield				
	Unit-5: Organic farming – Green manuring				
	Recycling of biodegradable municipal, agr				
	wastes - biocompost making methods,	types and method of			
	vermicomposting – field Application.				

Semes	ster IV (AY 2018-2020)	Period:	to		
Paper	: GE4T (Plant Anatomy and	Full Marks: 40	Cred	lit:04	
Embr	yology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Meristematic and permanent	tissues	(2	Susanta Kumar	
	Root and shoot apical meristems; Simple	e and complex	lectures)	Maity	
	tissues			,	
2	U nit 2: Organs		(4	Susanta Kumar	
	Structure of dicot and monocot root sten	n and leaf.	lectures)	Maity	
3	Unit 3: Secondary Growth		(4	Susanta	
	Vascular cambium – structure and funct	ion, seasonal activity.	lectures)	Kumar Maity	
	Secondary growth in root and stem, W	Vood (heartwood and		,	
	sapwood)				
4	Unit 4: Adaptive and protective system	ns	(4	Susanta Kumar	
	Epidermis, cuticle, stomata; General ad	ecount of adaptations	lectures)	Maity	
	in xerophytes and hydrophytes.				
5	Unit 5: Structural organization of flow	ver	(4	Susanta Kumar	
	Structure of anther and pollen; Structure		lectures)	Maity	
	Types of embryo sacs, organization and	ultrastructure of			
	mature embryo sac.				
6	Unit 6: Pollination and fertilization		(4	Susanta Kumar	
	Pollination mechanisms and adaptations		lectures)	Maity	
	fertilization; Seed-structure appendages	and dispersal			
	mechanisms.				
7	Unit 7: Embryo and endosperm		(4	Susanta	
	Endosperm types, structure and function	s; Dicot and	lectures)	Kumar Maity	
	monocot embryo; Embryo endosperm re	elationship			

Unit 8: Apomixis and polyembryony	(4	Susanta	
Definition, types and Practical applications	lectures)	Kumar Maity	

Semes	ster IV (AY 2018-2020)	Period:	to		
Paper	: GE4P (Plant Anatomy and	Full Marks: 20	Cred	lit: 02	
Embry	yology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of meristems through per photographs.	rmanent slides and	(1 lectures)	Susanta Kumar Maity	
2	2. Tissues (parenchyma, collenchyma an Macerated xylary elements, Phloem (Per photographs)		(1 lectures)	Susanta Kumar Maity	
3	3. Stem: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
4	4. Root: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
5	5. Leaf: Dicot and Monocot leaf (only Po	ermanent slides).	(1 lectures)	Susanta Kumar Maity	
6	6. Adaptive anatomy: Xerophyte (<i>Neriu</i> (<i>Hydrilla</i> stem).	um leaf); Hydrophyte	(2 lectures)	Susanta Kumar Maity	
7	7. Structure of anther (young and (amoeboid and secretory) (Permanent sli		(1 lectures)	Susanta Kumar Maity	
8	8. Types of ovules: anatropous, orthotro amphitropous/ campylotropous.	pous, circinotropous,	(1 lectures)	Susanta Kumar Maity	
9	9. Female gametophyte: <i>Polygonum</i> (mo Embryo sac Development (Permanent sl:		(1 lectures)	Susanta Kumar Maity	
10	10. Ultrastructure of mature egg app electron micrographs.	aratus cells through	(1 lectures)	Susanta Kumar Maity	
11	11. Pollination types and seed distinctuding appendages, aril, caruncle specimens).	•	(1 lectures)	Susanta Kumar Maity	
12	12. Dissection of embryo/endosperm fro	m developing seeds.	(1 lectures)	Susanta Kumar Maity	
13	13. Calculation of percentage of germina medium.	ated pollen in a given	(1 lectures)	Susanta Kumar Maity	

Seme	ster IV (AY 2018-2020)	Period:	to		
Paper	: SEC2T (Mushroom	Full Marks: 40	Cre	dit:04	
Cultu	reTechnology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional a edible mushrooms; Poisonous mushrooms. Typavailable in India - <i>Volvariellavolvacea</i> , <i>Agaricusbisporus</i> .	pes of edible mushrooms		Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology: Infrastruction available) Polythene bag, vessels, Inoculation low cost stove, sieves, culture rack, mushroom water sprayer, tray, small polythene bag, sterilization, preparation of spawn, multiple preparation - paddy straw, sugarcane trasseleaves. Factors affecting the mushroom bed technology, Composting technology in mushroom.	hook, inoculation loop, m unit (Thatched house) Pure culture: Medium, ication. Mushroom bed h, maize straw, banana preparation - Low cost		Dr.Nilay Kumar Maitra	
3	Unit 3: Storage and nutrition: Short-term upto 24 hours) Long term Storage (canning, storage in saltsolutions. Nutrition - Proteins elements nutrition - Carbohydrates, Crude fibr	storage (Refrigeration - pickels, papads), drying, - amino acids, mineral		Dr.Nilay Kumar Maitra	
4	Unit 4: Food Preparation: Types of foods prep mushroom.Research Centres - National level a benefit ratio - Marketing in India and abroad,	and Regional level.Cost		Dr.Nilay Kumar Maitra	

		GENERAL; CBCS)			
	ster I (AY 2017-2019)		to		
Paper	: GE1T (Biodiversity (Microbes, Algae,	Full Marks: 40	Credi	t: 04	
Fungi	and Archegoniate)) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Microbes		(12	Sk Md	
-	Viruses – Discovery, general structure,	replication (general	lectures)	Ismail Al Amin	
	account), DNA virus (T-phage); Lytic a		lectures	Amin	
	RNA virus (TMV); Economic importan				
	Discovery, General characteristics and o				
	Reproduction – vegetative, asexual and				
	(conjugation, transformation and trans				
	importance.				
2	Unit 2: Algae		(10	Susanta	
2	General characteristics; Ecology and dis	stribution: Range of	lectures)	Kumar	
	thallus organization and reproduction; (,	lectures	Maity	
	Morphology and life-cycles of the follo				
	Chlamydomonas, Oedogonium, Vauche	•			
	Polysiphonia. Economic importance of				
3	Unit 3: Fungi		(10	Dr. Nilay	
J	Introduction- General characteris	tics, ecology and	lectures)	Kumar Maitra	
	significance, range of thallus org	, C3		Iviaitia	
	composition, nutrition, reproduction as				
	Fungi- General characteristics, ecology				
	cycle of Rhizopus (Zygomycota)				
	(Ascomycota), Puccinia, Agarici				
	Symbiotic Associations-Lichens:	• /			
	reproduction and significance; Mycor	rhiza: ectomycorrhiza			
	and endomycorrhiza and their significan	nce.			
4	Unit 4: Introduction to Archegoniate		(10	Sk Md Ismail Al	
	Unifying features of archegoniates, Tr	ransition to land habit,	lectures)	Amin	
	Alternation of generations.				
5	Unit 5: Bryophytes				
	General characteristics, adaptation	s to land habit,			
	Classification, Range of thallus				
	organization.Classification (up to				
	anatomy and reproduction of				
	Funaria.(Developmental details not to	,			
	and economic importance of bryophyte	s with special mention			
	of Sphagnum.		/4.0	Carriera	
6	Unit 6: Pteridophytes	u Taula 1 1 1 1	(10	Susanta Kumar	
	General characteristics, classificatio		lectures)	Maity	
	(Cooksonia and Rhynia). Classifica			1,1410)	
	morphology, anatomy and reprodu				
	Equisetum and Pteris.(Development				
	included).Heterospory and seed ha				
	Ecological and economical importance	e of riendophytes.			
7	Unit 7: Gymnosperms		(4	Susanta	
,	General characteristics; Classification (un to family)	lectures)	Kumar	
	morphology, anatomy and reproduction	• / ·	icctures)	Maity	
	(Developmental details not to be included)				
	economical importance.	,. = 5 			
	<u> </u>			·	l

Como	otor I (AV 2017-2010)	Period: to			
	ster I (AY 2017-2019) : GE1P (Biodiversity (Microbes, Algae,	Period: to Full Marks: 20	Credit: 0	2	
_	and Archegoniate)) (Practical)	i uii Mai KS. 20	Greuit: U	4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. EMs/Models of viruses – T-F drawing/Photograph of Lytic and Lysog 2. Types of Bacteria from temporary/per photographs; EM bacterium; Binary Fission; Conjugation; Structure of root 3. Gram staining	enic Cycle. rmanent slides/	(4 lectures)	Sk Md Ismail Al Amin	
2	3. Study of vegetative and reproduct <i>Chlamydomonas</i> (electron micrographs) <i>Fucus* and Polysiphonia</i> through terpermanent slides. (* <i>Fucus</i> - Specimen a	, Oedogonium, Vaucheria, mporary preparations and and permanent slides)	(6 lectures)	Susanta Kumar Maity	
3	4. Rhizopus and Penicillium: Asexus mounts and sexual Structures through per 5. Alternaria: Specimens/photographs at 6. Puccinia: Herbarium specimens of E and infected Barberryleaves; section/te Wheat and permanent slides of both the 7. Agaricus: Specimens of button stage is Sectioning of gills of Agaricus. 8. Lichens: Study of growth forms of lich fruticose) 9. Mycorrhiza: ecto mycorrhiza (Photographs)	ermanent slides. Ind tease mounts. Black Stem Rust of Wheat ease mounts of spores on hosts. and full grown mushroom; Thens (crustose, foliose and	(6 lectures)	Dr. Nilay Kumar Maitra	
4	10. <i>Marchantia</i> - morphology of thallus, v.s. thallus through gemmacup, w.m. slides), v.s. antheridiophore, archegonic permanent slides). 11. <i>Funaria</i> - morphology, w.m. le peristome, annulus, spores(temporary showing antheridial and archegonial protonema.	e gemmae (all temporary ophore, l.s. sporophyte (all af, rhizoids, operculum, slides); permanent slides	(4 lectures)	Sk Md Ismail Al Amin	
	12. Selaginella- morphology, w.m. leaf strobilus, w.m.microsporophyll and m slides), l.s. strobilus (permanent slide). 14. Equisetum- morphology, t.s. intestrobilus, w.m. sporangiophore, w.m. dry)(temporary slides); t.s rhizome (permanent slide). 13. Pteris- morphology, t.s. rachis sporangium, w.m. spores(temporary siprothallus with sex organs and youn slide). 14. Cycas- morphology (coralloid roots root, t.s. rachis, v.s. leaflet, v.s. micro (temporary slides), l.s. ovule, t.s. root (p. 15. Pinus- morphology (long and dwarf male and female), w.m.dwarf shoot, t.s. male cone, w.m. microsporophyll, w.m. slides), l.s. female cone, t.l.s. &r.l.s. sten	ernode, l.s. strobilus, t.s. m. spores (wet and manent slide). , v.s. sporophyll, w.m. lides), t.s. rhizome, w.m. g sporophyte (permanent osporophyll, w.m. spores ermanent slide). shoots, w.m. dwarf shoot, needle, t.s. stem, , l.s./t.s. microspores (temporary	(6 lectures)	Susanta Kumar Maity	

Semester II (AY 2017-2019) Period: to	ark
Sl. No. TOPICS CLASSES ALLOTED Rem taken by Rem taken by Init- 1: Introduction (4 lectures) Scil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes 2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography (2 Dr. Nilay Nilay Dr. Nilay	ark
Si. No. TOPICS CLASSES ALLOTED Topics CLASSES ALLOTED Topics Class taken by Dr. Nilay Kumar Maitra Topics Class taken by Dr. Nilay Kumar Maitra Topics Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes 2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography Class ALLOTED (4 Dr. Nilay Kumar Maitra	ark
Unit- 2: Ecological factors Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes 2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography Kumar Maitra Kumar Maitra Kumar Maitra Kumar Maitra (4 Dr. Nilay Kumar Maitra Por Nilay Cycling of carbon, nitrogen and Phosphorous	
Unit- 2: Ecological factors Soil: Origin, formation, composition, soil profile. Water: States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes 2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography Iectures) Dr. Nilay Kumar Maitra Dr. Nilay Kumar Maitra Or. Nilay Kumar Maitra	
States of water in the environment, precipitation types. Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes 2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography C2 Dr. Nilay Kumar Maitra Por. Nilay Kumar Maitra Dr. Nilay Kumar Maitra	
Light and temperature: Variation Optimal and limiting factors; Shelford law of tolerance. Adaptation of hydrophytes and xerophytes 2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography C Dr. Nilay Kumar Maitra Dr. Nilay Kumar Maitra	
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hydrophytes and xerophytes 2	
2 Unit -3: Plant communities Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography (2 Dr. Nilay Kumar Maitra Dr. Nilay Kumar Maitra Dr. Nilay Kumar Maitra	
Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit-4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit-5: Phytogeography (2 Kumar Maitra Kumar Maitra Kumar Maitra Kumar Maitra Characters; Ecotone and edge effect; Succession; Processes and types	
Characters; Ecotone and edge effect; Succession; Processes and types 3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography Maitra Maitra	
3 Unit- 4: Ecosystem Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography (4 Dr. Nilay Kumar Maitra	
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Structure; energy flow trophic organisation; Food chains and food webs, Ecological pyramids production and productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography (2 Dr. Nilay	
productivity; Bio-geochemical cycling; Cycling of carbon, nitrogen and Phosphorous 4 Unit- 5: Phytogeography (2 Dr. Nilay	
nitrogen and Phosphorous 4 Unit- 5: Phytogeography (2 Dr. Nilay	
4 Unit- 5: Phytogeography (2 Dr. Nilay	
Principle of Biogeographical zone; Endemism. lectures) Maitra	
5 Unit- 6: Introduction to plant taxonomy (2 Susanta	
Identification, Classification, Nomenclature. lectures) Kumar Maity	
6 Unit-7: Identification (2 Susanta	
Functions of Herbarium, important herbaria and botanical lectures) Kumar	
gardens of the world and India; Documentation: Flora, Maity	
Keys: single access and multi-access	
7 Unit 8: Taxonomic evidences from palynology, cytology, (2 Susanta	
phytochemistry and molecular data. lectures) Kumar	
Maity	
8 Unit 9: Taxonomic hierarchy Ranks, categories and taxonomic groups (2 Susanta Kumar	
Ranks, categories and taxonomic groups lectures) Kumar Maity	
9 Unit 10: Botanical nomenclature (4 Susanta	
Principles and rules (ICN); ranks and names; binominal lectures) Kumar	
system, typification, author citation, valid publication, Maity	
rejection of names, principle of priority and its limitations.	
10 Unit 11: Classification (2 Susanta	
Types of classification-artificial, natural and phylogenetic. lectures) Kumar	
Bentham and Hooker (upto series), Engler and Prantl (upto	
series).	
Unit 12: Biometrics, numerical taxonomy and cladistics (2 Susanta	
Characters; variations; OTUs, character weighting and lectures) Kumar	
coding; cluster analysis; phenograms, cladograms Maity	
(definitions and differences).	

Seme	ster II (AY 2017-2019)	Period:	to		
Paper	:: GE2P (Plant Ecology and Taxonomy)	Full Marks: 20	Credi	t: 02	
(Pract	tical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of instruments used to measure variables: Soil thermometer, maximum a thermometer, anemometer, psychrometer gauge and lux meter.	(2 lectures)	Dr. Nilay Kumar Maitra		
2	2. Determination of pH, and analysis of carbonates, chlorides, nitrates, sulphates base deficiency by rapid field test.		(3 lectures)	Dr. Nilay Kumar Maitra	
3	3. Comparison of bulk density, porosity infiltration of water in soil of three habit	eats.	(3 lectures)	Dr. Nilay Kumar Maitra	
4	4. (a) Study of morphological adaptations of hydrophytes and xerophytes (four each). (b)Study of biotic interactions of the following: Stem parasite (<i>Cuscuta</i>), Root parasite (<i>Orobanche</i>), Epiphytes, Predation (Insectivorous plants)			Susanta Kumar Maity	
	5. Determination of minimal quadrat size herbaceous vegetation in the college care curve method. (species to be listed)		(2 lectures)	Dr. Nilay Kumar Maitra	
	6. Quantitative analysis of herbaceous v college campus for frequency and comp Raunkiaer's frequency distribution law		(2 lectures)	Dr. Nilay Kumar Maitra	
	7. Study of vegetative and floral character families (Description, V.S. flower, section diagram/s, floral formula/e and systemate to Bentham & Hooker's system of classification):Brassicaceae - Brassica, A Asteraceae - Sonchus/Launaea, Vernonia Eclipta/Tridax; Solanaceae - Solanum ni Lamiaceae - Salvia, Ocimum; Liliaceae - / Allium.	on of ovary, floral tic position according alyssum / Iberis; a/Ageratum, grum, Withania;	(8 lectures)	Susanta Kumar Maity	
	8. Mounting of a properly dried and pres wild plant with herbarium label (to be su book).	1	(4 lectures)	Sk Md Ismail Al Amin	

Semes		eriod:		to		
Paper	: GE3T (Economic Botany and Plant F	'ull Marks:	40	Cred	dit: 04	
Biotec	hnology) (Theory)					
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Origin of Cultivated Plants: Concept	of centres of	f	(4	Dr. Nilay Kumar	
	origin, their importance with reference to V	/avilov's wor	k.	lectures)	Maitra	
2	Unit 2: Cereals: Wheat -Origin, morphology	, uses		(2	Dr. Nilay	
				lectures)	Kumar Maitra	
3	Unit 3: Legumes: General account with spec	cial reference	e to	(2	Dr. Nilay	
	Gram and soybean			lectures)	Kumar Maitra	
4	Unit 4: Spices: General account with special	l reference to	o clove	(2	Dr. Nilay	
	and black pepper (Botanical name, family, p	oart used,		lectures)	Kumar Maitra	
	morphology and uses)					
5	U nit 5: Beverages :Tea (morphology, proce	essing, uses)		(2	Dr. Nilay Kumar	
				lectures)	Maitra	
6	Unit 6: Oils and Fats: General description w	ith special		(2	Dr. Nilay Kumar	
	reference to groundnut			lectures)	Maitra	
7	Unit 7: Fibre Yielding Plants: General descri	ption with sp	pecial	(2	Dr. Nilay Kumar	
	reference to Cotton (Botanical name, family	y, part used,		lectures)	Maitra	
	morphology and uses)					
8	Unit 8: Introduction to biotechnology			(2	Susanta	
				lectures)	Kumar Maity	
9	Unit 9: Plant tissue culture: Micropropagati	on · hanloid		(8	Susanta	
	production through androgenesis and gyno	•	٠f	lectures)	Kumar	
	account of embryo and endosperm culture	-		rectures,	Maity	
	applications.					
10	Unit 10: Recombinant DNA Techniques Blot	tting techniq	ues:	(10	Sk Md	
	Northern, Southern and Western Blotting, I			lectures)	Ismail	
	Fingerprinting; Molecular DNA markers i.e.		SNPs;	ŕ	Al	
	DNA sequencing, PCR and Reverse Transcrip	ptase-PCR.			Amin	
	Hybridoma and monoclonal antibodies, ELIS	SA and Immu	ıno			
	detection. Molecular diagnosis of human di	isease, Huma	an			
	gene Therapy					

Semes	ster III (AY 2017-2019)	Period:	to		
Paper	: GE3P (Economic Botany and Plant	Full Marks: 20	Credit	:02	
Biotec	hnology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of economically important plants	•	(6	Dr. Nilay Kumar	
	Soybean, Black pepper, Clove Tea, Cotton specimens, sections and micro chemical t	lectures)	Maitra		
2	2. Familiarization with basic equipments i	(2 lectures)	Susanta Kumar Maity		
3	3. Study through photographs: Anther cul embryogenesis, endosperm and embryo	·	(2 lectures)	Susanta Kumar	
	micropropagation.	icatares	Maity		
4	4. Study of molecular techniques: PCR, Blotting techniques, AGE			Sk Md Ismail Al	
	and PAGE.		lectures)	Amin	

Semester III (AY 2017-2019)		Period:	to		
Paper	: SEC1T (Biofertilizers) (Theory)	Full Marks: 40	Cred	lit:04	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit- 1: General account about the microbe	s used as biofertilizer -	(40	Dr.Nilay	
	Rhizobium – isolation, identification, mass based inoculants, Actinorrhizal symbiosis.	s multiplication, carrier	lectures)	Kumar Maitra	
	Unit- 2: Azospirillum: isolation and mass	*			
	,	ect of different			
	microorganisms. Azotobacter: classification,				
	response to Azotobacter inoculum, m multiplication.	aintenance and mass			
	Unit- 3: Cyanobacteria (blue green algae),				
	azollae association, nitrogen fixation, factors	s affecting growth, blue			
	green algae and Azolla in rice cultivation.				
	Unit- 4: Mycorrhizal association, types of a taxonomy, occurrence and distribution, phos	•			
	and yield – colonization of VAM – isolation a				
	of VAM, and its influence on growth and yield				
	Unit-5: Organic farming – Green manuring				
	Recycling of biodegradable municipal, agr				
	wastes - biocompost making methods,	types and method of			
	vermicomposting – field Application.				

Semester IV (AY 2017-2019) Period: to					
Paper	: GE4T (Plant Anatomy and	Full Marks: 40	Cred	lit:04	
Embr	yology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Meristematic and permanent	tissues	(2	Susanta	
	Root and shoot apical meristems; Simple	e and complex	lectures)	Kumar Maity	
	tissues			,	
2	U nit 2: Organs		(4	Susanta Kumar	
	Structure of dicot and monocot root sten	n and leaf.	lectures)	Maity	
3	Unit 3: Secondary Growth		(4	Susanta Kumar	
	Vascular cambium – structure and funct	ion, seasonal activity.	lectures)	Maity	
	Secondary growth in root and stem, W	Vood (heartwood and			
	sapwood)				
4	Unit 4: Adaptive and protective system		(4	Susanta Kumar	
	Epidermis, cuticle, stomata; General ad	ecount of adaptations	lectures)	Maity	
	in xerophytes and hydrophytes.			G	
5	Unit 5: Structural organization of flov		(4	Susanta Kumar	
	Structure of anther and pollen; Structure		lectures)	Maity	
	Types of embryo sacs, organization and	ultrastructure of			
	mature embryo sac.		/ 4	Susanta	
6	Unit 6: Pollination and fertilization	. D1.1.	(4	Kumar	
	Pollination mechanisms and adaptations		lectures)	Maity	
	fertilization; Seed-structure appendages mechanisms.	and dispersal			
	mechanisms.				
7	Unit 7: Embryo and endosperm		(4	Susanta	
	Endosperm types, structure and functions; Dicot and		lectures)	Kumar Maity	
	monocot embryo; Embryo endosperm re		,		
	Unit 8: Apomixis and polyembryony	•	(4	Susanta	
	Definition, types and Practical application	ons	lectures)	Kumar Maity	

Semes	ster IV (AY 2017-2019)	to			
Paper	: GE4P (Plant Anatomy and	Full Marks: 20	Cred	lit: 02	
Embr	yology) (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of meristems through pe photographs.		(1 lectures)	Susanta Kumar Maity	
2	2. Tissues (parenchyma, collenchyma ar Macerated xylary elements, Phloem (Perphotographs)	rmanent slides,	(1 lectures)	Susanta Kumar Maity	
3	3. Stem: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	elianthus; Secondary:	(1 lectures)	Susanta Kumar Maity	
4	4. Root: Monocot: Zea mays; Dicot: He Helianthus (only Permanent slides).	· · · · · · · · · · · · · · · · · · ·	(1 lectures)	Susanta Kumar Maity	
5	5. Leaf: Dicot and Monocot leaf (only P	ermanent slides).	(1 lectures)	Susanta Kumar Maity	
6	6. Adaptive anatomy: Xerophyte (<i>Neria</i> (<i>Hydrilla</i> stem).	um leaf); Hydrophyte	(2 lectures)	Susanta Kumar Maity	
7	7. Structure of anther (young and (amoeboid and secretory) (Permanent sl	(1 lectures)	Susanta Kumar Maity		
8	8. Types of ovules: anatropous, orthotro amphitropous/ campylotropous.	pous, circinotropous,	(1 lectures)	Susanta Kumar Maity	
9	9. Female gametophyte: <i>Polygonum</i> (mo Embryo sac Development (Permanent sl	1 / 1	(1 lectures)	Susanta Kumar Maity	
10	10. Ultrastructure of mature egg apprelectron micrographs.	paratus cells through	(1 lectures)	Susanta Kumar Maity	
11	11. Pollination types and seed di (including appendages, aril, caruncle specimens).	(1 lectures)	Susanta Kumar Maity		
12	12. Dissection of embryo/endosperm fro		(1 lectures)	Susanta Kumar Maity	
13	13. Calculation of percentage of germin medium.	ated pollen in a given	(1 lectures)	Susanta Kumar Maity	

Seme	ster IV (AY 2017-2019)	Period:	to		
Paper	r: SEC2T (Mushroom	Full Marks: 40	Cre	dit:04	
CultureTechnology) (Theory)					
Sl. No.	Sl. No. TOPICS			Class taken by	Remark
1	Unit 1: Introduction, history. Nutritional and medicinal value of edible mushrooms; Poisonous mushrooms. Types of edible mushrooms available in India - Volvariellavolvacea, Pleurotuscitrinopileatus, Agaricusbisporus.			Dr.Nilay Kumar Maitra	
2	Unit 2: Cultivation Technology: Infrastruc available) Polythene bag, vessels, Inoculation			Dr.Nilay Kumar Maitra	

	low cost stove, sieves, culture rack, mushroom unit (Thatched house) water sprayer, tray, small polythene bag. Pure culture: Medium, sterilization, preparation of spawn, multiplication. Mushroom bed preparation - paddy straw, sugarcane trash, maize straw, banana leaves. Factors affecting the mushroom bed preparation - Low cost technology, Composting technology in mushroom production.		
3	Unit 3: Storage and nutrition: Short-term storage (Refrigeration - upto 24 hours) Long term Storage (canning, pickels, papads), drying, storage in saltsolutions. Nutrition - Proteins - amino acids, mineral	Dr.Nilay Kumar Maitra	
4	elements nutrition - Carbohydrates, Crude fibre content - Vitamins. Unit 4: Food Preparation: Types of foods prepared from mushroom.Research Centres - National level and Regional level.Cost benefit ratio - Marketing in India and abroad, Export Value.	Dr.Nilay Kumar Maitra	

CURRICULUM PLAN (ODD SEMESTER)

(Chemistry GE; CBCS)

Semester I (AY 2022-2023) Period: 19			9.09.2022	to 4.02.20	23
	Paper: GE1T (Theory)	Full Marks: 40(7	Γ)+10(IA)+	-5(CA) Cr	edit: 04
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Section B: Organic Chemistry		20	Dr. Sutapa	
	StereoChemistry, Aliphatic Hydrocarbor	ıs		Ray	
2	Section A: Inorganic Chemistry		20	Dr.	
	Atomic Structure, Chemical Periodicity,	Redox Reactions		Soumya	
				Sundar	
				Mati	
3	Section A: Inorganic Chemistry		20	Hillol	
	Acid and Bases.			Khatua	
	Section B: Organic Chemistry				
	Fundamentals of Organic Chemist	ry, <u>Nucleophilic</u>			
	substitution and Elimination reactions				

	Semester I (AY 2022-2023)	Period:	19.09.2022	to 4.02.20	23
	Paper: GE1P (Practical)	Full M	larks: 20	Credit: 02	
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	Atomic Structure, Chemical Periodicity,	Acid and Bases,	60	Dr.	
	Redox Reactions, General Organic	Chemistry and		Soumya	
	Aliphatic Hydrocarbon			Sundar	
				Mati, Dr.	
				Sutapa Ray	
				& Hillol	
				Khatua	

(Chemistry General; CBCS)

Semester I (AY 2022-2023) Period: 19.09.2022 to 4.02.2023					3
Paper	: DSC1AT(CC1)(Theory)	Full	Marks: 60(T)+10(IA)+5 (CA) Cred	it:4
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Section A: Inorganic Chemistry Atomic Structure		20	Dr. Soumya Sundar Mati	
2	Section A: Inorganic Chemistry Chemical Bonding and Molecular struct	ure	10	Hillol Khatua	
3	Section B: Organic Chemistry StereoChemistry, Aliphatic Hydrocarbo	ns	20	Dr. Sutapa Ray	
4	Section B: Organic Chemistry Fundamentals of Organic Chemistry		10	Hillol Khatua	

	Semester I (AY 2022-2023)		Period:	19.09.2022 to 4.02.2023	3
Paper	: DSC1AP(CC1)(Practical)	Full Ma	rks: 20	Credit:2	
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	Atomic Structure, Chemical Periodicity	, Acid	60	Dr. Soumya Sundar	
	and Bases, Redox Reactions, General Organic			Mati, Dr. Sutapa Ray &	
	Chemistry and Aliphatic Hydrocarbon			Hillol Khatua	

CURRICULUM PLAN (EVEN SEMESTER) (Chemistry GE; CBCS)

Semester II (AY 2022-2023)		Period:	20.3.202	23 to 28.7.2023		
Paper: GE2 (Theory)		Full Marl	ks: 40(T	')+10(IA)+5(CA)	Cre	edit: 04
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by		Remark
1	Section A: Physical Chemistry		20	Dr. Soumya Sundar		
	Kinetic Theory of Gases and Real gases	,		Mati		
	Liquids, Solids					
2	Section A: Physical Chemistry		10	Hillol Khatua		
	Chemical Kinetics					
3	Section B: Inorganic Chemistry-II		20	Dr. Sutapa Ray		
	Chemical Bonding and Molecular Struc	ture				
	(Covalent Bonding to MO), Comparativ	e study				
	of p-block elements					
4	Section B: Inorganic Chemistry-II	·	10	Hillol Khatua		
	Chemical Bonding and Molecular Struc	ture				
	(Ionic Bonding)					

Semester II (AY 2022-2023)		Period: 20.3.2023 to 28.7.2023				
Paper: GE2P (Practical)		Full Marks: 20	Cre			
Sl. No. TOPICS			CLASSES ALLOTED	Class taken by	Remark	
1	STATES OF MATTER & CHEMICAL KINETICS, CHEMICAL BONDING & MOLECULAR STRUCTURE, p-BLOCK ELEMENTS		60	Dr. Soumya Sundar Mati, Dr. Sutapa Ray & Hillol Khatua		

(ENVS AECC; CBCS)

Seme	ster II (AY 2022-2023)	Period: 20.3.2023 to 28.7.2023						
Paper: ENVS (AECC) (Theory) Full Marks: 50(T)+1					5(IA)+5(CA)+30(P) Credit:4			
Sl. No.	TOPICS			CLASSES ALLOTED	Class taken by	Remark		
1	Unit-1: Introduction to environmental studies			2	Hillol Khatua			
2	Unit-2: Ecosystem			6	Dr. Sutapa Ray			
3	Unit-3: Natural Resources: Renewable and Non-renewable resources				Dr. Sutapa Ray			
4	Unit-4: Biodiversity and conservation			8	Hillol Khatua			
5	Unit-5: Environmental Polleution			8	Dr. Soumya Sundar Mati			
6	Unit-6:Environmental Policies and Practices			7	Dr. Soumya Sundar Mati			
7	Unit-7: Human Communities and the En	nvironment		6	Hillol Khatua			
8	Unit-8: Field work			5	Dr. Soumya Sundar Mati, Dr. Sutapa Ray & Hillol Khatua			

CURRICULUM PLAN(EVEN SEMESTER) (Chemistry General; CBCS)

Semester II (AY 2022-2023)			Period: 20.3.2023 to 28.7.2023				
Paper: DSC1BT(CC2)(Theory)			Full Marks: 60(T)+10(IA)+5 (CA) Credit:4				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark		
1	Section A: Physical Chemistry Chemical Energetic, Chemical Equilibri	um	20	Dr. Soumya Sundar Mati			
2	Section A: Physical Chemistry Ionic Equilibria		10	Hillol Khatua			
3	Section B: Organic Chemistry Aromatic Hydrocarbon to Phenols		20	Dr. Sutapa Ray			
4	Section B: Organic Chemistry Ethers to Aldehydes &Ketones		10	Hillol Khatua			

Semester II (AY 2022-2023)			20.3.20	23 to 28.7.2023	
Paper: DSC1BP(CC2)(Practical)		Full Ma	rks: 20	Credit:2	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
			ALLUTED		
1	Chemical Energetics, Equilibria & Functional		60	Dr. Soumya Sundar	
	Organic Chemistry			Mati, Dr. Sutapa	
				Ray & Hillol Khatua	

CURRICULUM PLAN (ODD SEMESTER) (Chemistry GE; CBCS)

Seme	Semester I (AY 2021-2022) Online+ Offline		.10.2021	to 24.02.20	22
	Paper: GE1T (Theory) Full Marks: 40(Γ)+10(IA)+	-5(CA) Cr	edit: 04
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Section B: Organic Chemistry		20	Dr. Sutapa	
	StereoChemistry, Aliphatic Hydrocarbor	ıs		Ray	
2	Section A: Inorganic Chemistry		20	Dr.	
	Atomic Structure, Chemical Periodicity,	Redox Reactions		Soumya	
				Sundar	
				Mati	
3	Section A: Inorganic Chemistry		20	Hillol	
	Acid and Bases,			Khatua	
	Section B: Organic Chemistry				
	Fundamentals of Organic Chemist	ry, <u>Nucleophilic</u>			
	substitution and Elimination reactions				

Seme	Semester I (AY 2021-2022) Online+ Offline		1.10.2021	to 24.02.20	22
	Paper: GE1P (Practical)	Full M	larks: 20	Credit: 02	
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	Atomic Structure, Chemical Periodicity,	Acid and Bases,	60	Dr.	
	Redox Reactions, General Organic	Chemistry and		Soumya	
	Aliphatic Hydrocarbon			Sundar	
	r state grant and			Mati, Dr.	
				Sutapa Ray	
				& Hillol	
				Khatua	

(Chemistry General; CBCS)

Seme	ster I (AY 2021-2022) Online+ Offline		Period	: 1.10.2021 to 24.	02.2022	2
Paper	: DSC1AT(CC1)(Theory)	Full	Marks: 60	(T)+10(IA)+5 (CA)	Credi	t:4
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by		Remark
1	Section A: Inorganic Chemistry Atomic Structure		20	Dr. Soumya Sundar	r Mati	
2	Section A: Inorganic Chemistry Chemical Bonding and Molecular struct	ure	10	Hillol Khatua		
3	Section B: Organic Chemistry StereoChemistry, Aliphatic Hydrocarbo	ns	20	Dr. Sutapa Ray		
4	Section B: Organic Chemistry Fundamentals of Organic Chemistry		10	Hillol Khatua		

Seme	ster I (AY 2021-2022) Online+ Offline	F	Period: 1.	10.2021 to 24.02.202	22
Paper: DSC1AP(CC1)(Practical)			rks: 20	Credit:2	
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	Atomic Structure, Chemical Periodicity	, Acid	60	Dr. Soumya Sundar	
	and Bases, Redox Reactions, General Organic			Mati, Dr. Sutapa	
	Chemistry and Aliphatic Hydrocarbon			Ray & Hillol Khatua	

CURRICULUM PLAN(EVEN SEMESTER) (Chemistry GE; CBCS)

Seme	ster II (AY 2021-2022)	Period:	01.4.202	22 to 09.7.2022		
Paper	: GE2 (Theory)	Full Marl	ks: 40(T)+10(IA)+5(CA)	Cre	edit: 04
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by		Remark
1	Section A: Physical Chemistry Kinetic Theory of Gases and Real gases Liquids, Solids	,	20	Dr. Soumya Sundar Mati		
2	Section A: Physical Chemistry Chemical Kinetics		10	Hillol Khatua		
3	Section B: Inorganic Chemistry-II Chemical Bonding and Molecular Struc (Covalent Bonding to MO), Comparativ of p-block elements		20	Dr. Sutapa Ray		
4	Section B: Inorganic Chemistry-II Chemical Bonding and Molecular Struc (Ionic Bonding)	ture	10	Hillol Khatua		

Seme	ster II (AY 2021-2022)	Period: 01.4.2022 to	09.7.202	22	
Paper: GE2P (Practical)		Full Marks: 20	Cre	edit: 02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	STATES OF MATTER & CHEMICAL KIN BONDING & MOLECULAR STRUCTURE ELEMENTS	· ·	60	Dr. Soumya Sundar Mati, Dr. Sutapa Ray & Hillol Khatua	

Semes	ster II (AY 2021-2022)	Period: 01.4.2022 to 09.7.2022			
Paper	: ENVS (AECC) (Theory)	Full Marks: 50(T)+15	(IA)+5(CA)+30(P) Credi	it:4
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit-1: Introduction to environmental s	studies	2	Hillol Khatua	
2	Unit-2: Ecosystem		6	Dr. Sutapa Ray	
3	Unit-3: Natural Resources: Renewable a resources	and Non-renewable	8	Dr. Sutapa Ray	
4	Unit-4: Biodiversity and conservation		8	Hillol Khatua	
5	Unit-5: Environmental Polleution		8	Dr. Soumya Sundar Mati	
6	Unit-6:Environmental Policies and Prac	ctices	7	Dr. Soumya Sundar Mati	
7	Unit-7: Human Communities and the En	nvironment	6	Hillol Khatua	
8	Unit-8: Field work		5	Dr. Soumya Sundar Mati, Dr. Sutapa Ray & Hillol Khatua	

CURRICULUM PLAN(EVEN SEMESTER) (Chemistry General; CBCS)

Semester II (AY 2021-2022) Period: 01.4.2022 to 09.7.2022					
Paper	: DSC1BT(CC2)(Theory)	Full	Marks: 60(T)+10(IA)+5 (CA) Credi	t:4
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	Section A: Physical Chemistry		20	Dr. Soumya Sundar Mati	
	Chemical Energetic, Chemical Equilibri	um		•	
2	Section A: Physical Chemistry		10	Hillol Khatua	
	Ionic Equilibria				
3	Section B: Organic Chemistry		20	Dr. Sutapa Ray	
	Aromatic Hydrocarbon to Phenols				
4	Section B: Organic Chemistry		10	Hillol Khatua	
	Ethers to Aldehydes &Ketones				

Semes	ster II (AY 2021-2022)	Period:	01.4.20	22 to 09.7.2022	
Paper: DSC1BP(CC2)(Practical)		Full Ma	rks: 20	Credit:2	
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	Chemical Energetics, Equilibria & Func	tional	60	Dr. Soumya Sundar	
	Organic Chemistry			Mati, Dr. Sutapa	
				Ray & Hillol Khatua	

CURRICULUM PLAN (ODD SEMESTER) (Chemistry GE; CBCS)

S	emester I (AY 2020-2021) Online	Period: 16.	12.2020	to March 20	21
	Paper: GE1T (Theory) Full Marks: 40(7)+10(IA)+5	5(CA) Cre	dit: 04
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Section B: Organic Chemistry		20	Dr. Sutapa	
	StereoChemistry, Aliphatic Hydrocarb	ons		Ray	
2	Section A: Inorganic Chemistry		20	Dr.	
	Atomic Structure, Chemical Periodicit	y, Redox Reactions		Soumya	
				Sundar	
				Mati	
3	Section A: Inorganic Chemistry		20	Hillol	
	Acid and Bases.			Khatua	
	Section B: Organic Chemistry				
	<u>Fundamentals</u> of Organic Chemi	•			
	substitution and Elimination reactions	<u>S</u>			

Se	emester I (AY 2020-2021) Online	Period: 16	.12.2020	to March 202	21
	Paper: GE1P (Practical)	Full Ma	rks: 20	Credit: 02	
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	Atomic Structure, Chemical Periodic	ity, Acid and Bases,	60	Dr.	
	Redox Reactions, General Organi	ic Chemistry and		Soumya	
	Aliphatic Hydrocarbon			Sundar	
	r Ji Ji			Mati, Dr.	
				Sutapa Ray	
				& Hillol	
				Khatua	

CURRICULUM PLAN(EVEN SEMESTER)

(Chemistry GE; CBCS)

Seme	ster II (AY 2020-2021) Online	Period:	26.4.202	21 to 24.8.2021		
Paper	: GE2 (Theory)	Full Mark	s: 40(T)+10(IA)+5(CA)	Credit: 0)4
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remar	rk
1	Section A: Physical Chemistry		20	Dr. Soumya Sundar		
	Kinetic Theory of Gases and Real gases	,		Mati		
	Liquids, Solids					
2	Section A: Physical Chemistry		10	Hillol Khatua		
	Chemical Kinetics					
3	Section B: Inorganic Chemistry-II		20	Dr. Sutapa Ray		
	Chemical Bonding and Molecular Struc	ture				
	(Covalent Bonding to MO), Comparativ	e study				
	of p-block elements					
4	Section B: Inorganic Chemistry-II		10	Hillol Khatua		
	Chemical Bonding and Molecular Struc	ture				
	(Ionic Bonding)					

Semester II (AY 2020-2021) Online		Period: 26.4.2021 to	24.8.202	21	
Paper: GE2P (Practical)		Full Marks: 20	Cre	edit: 02	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	STATES OF MATTER & CHEMICAL KIN BONDING & MOLECULAR STRUCTURE ELEMENTS	•	60	Dr. Soumya Sundar Mati, Dr. Sutapa Ray & Hillol Khatua	

Seme	ster II (AY 2020-2021) Online	Period: 26.4.2021	to 24.8.2	021	
Paper	Paper: ENVS (AECC) (Theory) Full Marks: 50(T)+1)+30(P) Credi	it:4
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit-1: Introduction to environmental s	studies	2	Hillol Khatua	
2	Unit-2: Ecosystem		6	Dr. Sutapa Ray	
3	Unit-3: Natural Resources: Renewable a resources	and Non-renewable	8	Dr. Sutapa Ray	
4	Unit-4: Biodiversity and conservation		8	Hillol Khatua	
5	Unit-5: Environmental Polleution		8	Dr. Soumya Sundar Mati	
6	Unit-6:Environmental Policies and Prac	ctices	7	Dr. Soumya Sundar Mati	
7	Unit-7: Human Communities and the En	nvironment	6	Hillol Khatua	
8	Unit-8: Field work		5	Dr. Soumya Sundar Mati, Dr. Sutapa Ray & Hillol Khatua	

CURRICULUM PLAN (ODD SEMESTER) (Chemistry GE; CBCS)

Semester I (AY 2019-2020) Peri		Period: 22.	07.2019	to 21.11.201	19
	Paper: GE1T (Theory)	Full Marks: 40(T))+10(IA)+!	5(CA) Cre	edit: 04
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Section B: Organic Chemistry		30	Dr. Sutapa	
	Fundamentals of Organic Chemistry	y, StereoChemistry,		Ray	
	Nucleophilic substitution and Elin	nination reactions,			
	Aliphatic Hydrocarbons				
2	Section A: Inorganic Chemistry		30	Dr.	
	Atomic Structure, Chemical Periodicity, Acid and Bases,			Soumya	
	Redox Reactions			Sundar	
				Mati	

Semester I (AY 2018-2019)		Period: 18.0	07.2018 t	o 16.11.20	18
	Paper: GE1P (Practical)	Full Mar	ks: 20	Credit: 02	
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Atomic Structure, Chemical Periodic	ity, Acid and Bases,	60	Dr.	
	Redox Reactions, General Organi	c Chemistry and		Soumya	
	Aliphatic Hydrocarbon			Sundar	
				Mati &	
				Dr.	
				Sutapa	
				Ray	

CURRICULUM PLAN(EVEN SEMESTER)

(Chemistry GE; CBCS)

Semes	ster II (AY 2019-2020) Online from April	Perio	od: 02.0	1.2020 to 06.5.2020		
Paper: GE2 (Theory)		Full	Marks: 4	40(T)+10(IA)+5(CA)	Cr	edit: 04
Sl. No.	TOPICS		CLASSES	Class taken by		Remark
			ALLOTED			
1	Section A: Physical Chemistry-I		30	Dr. Soumya Sundar		
	Kinetic Theory of Gases and Real gases,			Mati		
	Liquids, Solids, Chemical Kinetics					
2	Section B: Inorganic Chemistry-II		30	Dr. Sutapa Ray		
	Chemical Bonding and Molecular Structure	٠,				
	Comparative study of p-block elements					

Semes	ster II (AY 2019-2020) Online from April	pril Period: 02.01.2020 to 06.5.2020			
Paper: GE2P (Practical)		Full Marks: 20 Credit: 02			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	STATES OF MATTER & CHEMICAL KINETIC BONDING & MOLECULAR STRUCTURE, p-E ELEMENTS	•	60	Dr. Soumya Sundar Mati & Dr. Sutapa Ray	

Semes	Semester II (AY 2019-2020) Online from April Period: 02.01.2020 to 06.5.2020					
Paper	Paper: ENVS (AECC) (Theory) Full Marks: 50(T)-			(CA)+30(P) C	redit:4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	Unit-1: Introduction to environmental stud	lies	2	Dr. Soumya Sundar Mati		
2	Unit-2: Ecosystem		6	Dr. Sutapa Ray		
3	Unit-3: Natural Resources: Renewable and resources	Non-renewable	8	Dr. Sutapa Ray		
4	Unit-4: Biodiversity and conservation		8	Dr. Sutapa Ray		
5	Unit-5: Environmental Polleution		8	Dr. Soumya Sundar Mati		
6	Unit-6:Environmental Policies and Practice	es	7	Dr. Soumya Sundar Mati		
7	Unit-7: Human Communities and the Envir	onment	6	Dr. Soumya Sundar Mati		
8	Unit-8: Field work		5	Dr. Soumya Sundar Mati & Dr. Sutapa Ray		

CURRICULUM PLAN (Full year) (Chemistry General; 3T B.Sc)

3 rd year (AY 2018-2019) Pe		Period:	16.07.20	18 to 15.03.2019	
Paper	: 3TG (Theory)	Full Mar	ks: 50		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Chemistry Group -A: Applied Chemistry Chemical separation process, Amino acids, pe and proteins, Nucleic acids, Drug, Synthesis of and use &Hydrogenation of oil		30	Dr. Sutapa Ray	
2	Chemistry Group -A: Applied Chemistry Manufacturing of some important Industrial Products, Petroleum, Pesticides, Food Additiv &Error analysis		30	Dr. Soumya Sundar Mati	

3 rd yea	ar (AY 2018-2019)	Period: 16.07.2018 to 15.03.2019			
Paper	: 3TG (Practical)	Full Marks: 50			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Group -B: Practical Chemistry		60	Dr. Soumya Sundar Mati & Dr. Sutapa Ray	

(ENVS Compulsory)

3rd ye	ar (AY 2018-2019)	Period: 16.07.2	018 to 1	5.03.2019	
Paper: ENVS (Compulsory) (Theory) Full		Full Marks: 70(T)	Marks: 70(T)+ 30(P)		
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: The Multidisciplinary nature of env	ironmental	5	Dr. Soumya Sundar Mati	
2	Unit 2: Natural resources: Renewable and resources	non-renewable	5	Dr. Sutapa Ray	
3			5	Dr. Sutapa Ray	
4	Unit 4: Biodiversity and its conservation		5	Dr. Sutapa Ray	
5	Unit 5 :Environmental Degradation and Po	llution	5	Dr. Sutapa Ray	
6	Unit-6: Social Issues and the Environment		15	Dr. Soumya Sundar Mati	
7	Unit-7: Human Population and the Environ	ment	10	Dr. Soumya Sundar Mati	
8	Unit-8: Field Work Report I Project Report	I Term Paper	5	Dr. Soumya Sundar Mati & Dr. Sutapa Ray	

CURRICULUM PLAN(ODD SEMESTER)

(Chemistry GE; CBCS)

	-	_			
	Semester I (AY 2018-2019) Period: 18.		.07.2018	to 16.11.201	18
	Paper: GE1T (Theory)	Full Marks: 40(T))+10(IA)+!	5(CA) Cre	edit: 04
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Section B: Organic Chemistry		30	Dr. Sutapa	
	Fundamentals of Organic Chemistry	, Stereo Chemistry,		Ray	
	Nucleophilic substitution and Elin	nination reactions,			
	Aliphatic Hydrocarbons				
2	Section A: Inorganic Chemistry		30	Dr.	
	Atomic Structure, Chemical Periodicity, Acid and Bases,			Soumya	
	Redox Reactions			Sundar	
				Mati	

Semester I (AY 2018-2019) Period: 18			07.2018 t	o 16.11.20	18
	Paper: GE1P (Practical)	Full Mar	ks: 20	Credit: 02	
Sl.	TOPICS		CLASSES	Class	Remark
No.			ALLOTED	taken by	
1	Atomic Structure, Chemical Periodic	ity, Acid and Bases,	60	Dr.	
	Redox Reactions, General Organi	c Chemistry and		Soumya	
	Aliphatic Hydrocarbon	•		Sundar	
				Mati &	
				Dr.	
				Sutapa	
				Ray	

CURRICULUM PLAN(EVEN SEMESTER)

(Chemistry GE; CBCS)

Semes	Semester II (AY 2018-2019) Period: 31.01.2019 to 31.5.2019					
Paper	: GE2 (Theory)	Full	Marks: 4	40(T)+10(IA)+5(CA)	Cr	edit: 04
Sl. No.	TOPICS		CLASSES	Class taken by		Remark
			ALLOTED			
1	Section A: Physical Chemistry-I		30	Dr. Soumya Sundar		
	Kinetic Theory of Gases and Real gases,			Mati		
	Liquids, Solids, Chemical Kinetics					
2	Section B: Inorganic Chemistry-II		30	Dr. Sutapa Ray		
	Chemical Bonding and Molecular Structure	١,				
	Comparative study of p-block elements					

Semes	emester II (AY 2018-2019) Period: 31.01.2019 to 31.5.2019				
Paper: GE2P (Practical) Full Marks: 20				Credit: 02	
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	STATES OF MATTER & CHEMICAL KINETICS, CHEMICAL			Dr. Soumya	
	BONDING & MOLECULAR STRUCTURE, p-BLOCK			Sundar Mati	
	ELEMENTS			& Dr. Sutapa	
				Ray	

Semester II (AY 2018-2019) Period: 31.01		Period: 31.01.2	019 to 3	1.5.2019	
Paper	: ENVS (AECC) (Theory)	Full Marks: 50(T)	+15(IA)+5	(CA)+30(P) C	redit:4
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit-1: Introduction to environmental stud	lies	2	Dr. Soumya Sundar Mati	
2	Unit-2: Ecosystem		6	Dr. Sutapa Ray	
3	Unit-3: Natural Resources: Renewable and Non-renewable resources			Dr. Sutapa Ray	
4	Unit-4: Biodiversity and conservation		8	Dr. Sutapa Ray	
5	Unit-5: Environmental Pollution		8	Dr. Soumya Sundar Mati	
6	Unit-6:Environmental Policies and Practices		7	Dr. Soumya Sundar Mati	
7	Unit-7: Human Communities and the Environment		6	Dr. Soumya Sundar Mati	
8	Unit-8: Field work		5	Dr. Soumya Sundar Mati & Dr. Sutapa Ray	

Curriculum Plan (EVEN SEMESTER) Semester II

(Zoology Honours; CBCS)

Semester II (AY 2023-2024)		Period: Feb,2023 to July,2023			
Pape	er: CC 3T (Non- Chordates-II)	Full Marks:	55 Cre	edit:4	
(The	-				
Sl.	Paper/Topic	CLASSES	Class taken by	Remark	
No.	ruper/ropie	ALLOTED	diass taken by	Remark	
-	Unit 1: Introduction				
1	Evolution of coelom and	2			
	metamerism		DEBARSHI		
	metamensm		MONDAL		
	Unit 2: Annelida	10	DEBARSHI		
	General characteristics and		MONDAL		
	Classification up to classes		MONDAL		
	Excretion in Annelida through				
	nephridia.				
	Metamerism in Annelida.	4.6	DEDARGUY		
	Unit 3:Arthropoda General characteristics and	16	DEBARSHI		
	Classification up to classes Vision in		MONDAL		
	Insecta only.				
	Respiration in Arthropoda (Gills in				
	prawn and trachea in cockroach)				
	Metamorphosis in Lepidopteran				
	Insects.				
	Social life in termite				
	Unit 4: Onychophora	2	DEBARSHI		
	General characteristics and		MONDAL		
	Evolutionary significance		_		
	Unit 5: Mollusca	10	DEBARSHI		
	General characteristics and		MONDAL		
	Classification up to classes				
	Nervous system and torsion in Gastropoda				
	Feeding and respiration in <i>Pila</i> sp				
	Unit 6: Echinodermata	8	DEBARSHI		
	General characteristics and	0			
	Classification up to classes		MONDAL		
	Water-vascular system in Asteroidea				
	Larval forms in Echinodermata				
	Affinities with Chordates				
	Unit 7: Hemichordata	2	DEBARSHI		
	General characteristics of phylum		MONDAL		
	Hemichordata. Relationship with		110112112		
	non-chordates and chordates				

Carre	ostor II (AV 2022-2024)	David d. Fala	2022 45 [] 2	022	
	ester II (AY 2023-2024)	Period:Feb,2023 to July,2023 Full Marks: 20 Credit:2			
-	er: CC 3P (Non- Chordates-II)	Full Marks:	20 C.	realt:2	
_	ctical)	CLACCEC	Cl + - l l	Dl-	
Sl.	Paper/Topic	CLASSES	Class taken by	Remark	
No.		ALLOTED	DEDARCHI		
1	1. Study of following specimens: a. Annelids - Aphrodite, Nereis, Heteronereis, Sabella, Serpula, Chaetopterus, Pheretima, Hirudinaria b. Arthropods - Limulus, Palamnaeus, Palaemon, Daphnia, Balanus, Sacculina, Cancer, Eupagurus, Scolopendra, Julus, Bombyx, Periplaneta, termites and honey bees Onychophora - Peripatus c. Molluscs - Chiton, Dentalium, Pila, Doris, Helix, Unio, Ostrea, Pinctada, Sepia, Octopus, Nautilus d. Echinodermates - Pentaceros/Asterias, Ophiura, Clypeaster, Echinus, Cucumaria and e. Antedon	6	DEBARSHI MONDAL		
2	2. Study of digestive system, septal	3	DEBARSHI		
	nephridia and pharyngeal nephridia of earthworm	5	MONDAL		
3	3. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm	2	Dr. Sudipta Chakraborty		
4	4. Mount of mouth parts and dissection of digestive system and nervous system of Periplaneta*	2	Dr. Sudipta Chakraborty		
5	5. To submit a Project Report on any related topic to larval forms (crustacean, mollusc and echinoderm)	3	DEBARSHI MONDAL		

Semester II (AY 2023-2024)		Period: Feb,2023 to July,2023		
Paper: CC 4T (Cell Biology) (Theory)		Full Marks: 55 Credit:4		
Sl. No.	Paper/Topic	CLASSE S ALLOTE D	Class taken by	Remark
1	Unit 1: Overview of Cells Basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma	2 2	Dr. MANIDIP SHASMAL	
2	Unit 2: Plasma Membrane Ultra structure and composition of Plasma membrane: Fluid mosaic model Transport across membrane: Active and Passive transport, Facilitated transport Cell junctions: Tight junctions, Gap junctions, Desmosomes	6	Dr. MANIDIP SHASMAL	
3	Unit 3: Cytoplasmic organelles I Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes Protein sorting and mechanisms of vesicular transport	5	Dr. MANIDIP SHASMAL	
4	Unit 4: Cytoplasmic organelles II Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondria Peroxisomes: Structure and Functions Centrosome: Structure and Functions	6	Dr. MANIDIP SHASMAL	
5	Unit 5: Cytoskeleton Type, structure and functions of cytoskeleton Accessory proteins of microfilament & microtu A brief idea about molecular motors	5	Dr. MANIDIP SHASMAL	
6	Unit 6: Nucleus Structure of Nucleus: Nuclear envelope, Nuclea Chromatin: Euchromatin and Hetrochromatin a	8 8 r pore comple nd packaging (Dr. x, Musicolus nucleosome) SHASMAL	

7	Unit 7: Cell Division Cell cycle and its regulation, Cancer (Concept oncogenes and tumor suppressor genes with special reference to p53 Retinoblastoma and Ras and APC. Mitosis and Meiosis: Basic process and their significance		Dr. Sudipta Chakraborty
8	Unit 8: Cell Signaling Cell signalling transduction pathways; Types of signaling molecules and receptors GPCR and Role of second messenger (cAMP) Extracellular matrix-Cell interactions Apoptosis and Necrosis	8	Dr. Sudipta Chakraborty

Sem	ester II (AY 2023-2024)	Period: Feb,2023 to July,2023		
Paper: CC 4P (Cell Biology) (Practical)		Full Marks: 20 Credit:2		
Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis	4	Dr. MANIDIP SHASMAL	
2	2. Study of various stages of meiosis.	4	DEBARSHI MONDAL	
3	3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.	4	DEBARSHI MONDAL	
4	4. Preparation of permanent slide to demonstrate: a. DNA by Feulgen reaction b. Cell viability study by Trypan Blue staining c. Mitochondria identification through vital staining	4	Dr. MANIDIP SHASMAL	

Curriculum Plan (EVEN SEMESTER) Semester IV

(Zoology Honours; CBCS)

	(Zoology nollours	, abasj		
Sem	ester IV (AY 2023-2024)	Period: Fe	eb,2023 to	0
		July,2023		
Pape	er: CC8T (Comparative Anatomy of Vertebrates	Full Marks:55		
) (Tł	neory)	Credit:4		
Sl.	TOPICS	CLASSES	Class	Remar
No.		ALLOTE	taken by	k
1101		D		
1	Unit 1: Integumentary System	6	DEBARSHI	
1		0	MONDAL	
	Structure, function and derivatives of		MONDAL	
	integument in amphibian, birds and mammals			
2	Unit 2: Skeletal System	6	DEBARSHI	
	Overview of axial and appendicular skeleton;		MONDAL	
	Jaw suspension; Visceral arches.			
	Jaw suspension, visceral arches.			
3	Unit 3: Digestive System	6	DEBARSHI	
3	Cint 3. Digestive System	0		
	Comparative anatomy of stomach; dentition in		MONDAL	
	mammals			
4	Unit 4: Respiratory System	6	DEBARSHI	
	Despiratory organs in fish amphibian hirds and		MONDAL	
	Respiratory organs in fish, amphibian, birds and mammals		11011211	
	Illallillais			
5	Unit 5: Circulatory System	6	DEDADCHI	
)	one 3. Circulatory System	О	DEBARSHI	
	General plan of circulation, Comparative		MONDAL	
	account of heart and aortic arches			
6	Unit 6: Urinogenital System	6	DEBARSHI	
	Succession of kidney, Evolution of urinogenital		MONDAL	
	ducts, Types of mammalian uteri			
	asses, types of maintainan accir			
7	Unit 7: Nervous System	8	Dr.	
′	Carlot vous System	O		
	Comparative account of brain, Cranial nerves in		MANIDIP	
	mammals		SHASMAL	
8	Unit 8: Sense Organs	6	Dr.	
	Classification of receptors, Brief account of		MANIDIP	
	olfactory and auditory receptors in vertebrate		SHASMAL	
	and dualitory receptors in vertebrate			
ĺ.		1	1	1

Sem	ester IV (AY 2023-2024)	Period	l: Feb,2023	to July,202	3
Pape	er: CC8P (Comparative Anatomy	Full M	arks: 20	Credi	it: 2
of Ver	of Vertebrates) (Practical)		.	,	
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	1. Study of placoid, cycloid and scales through pe slides/photographs.	ctenoid rmanent	3	DEBARSHI MONDAL	
2	Study of disarticulated skeleton of Toad, Pigeon and Guineapig.		4	DEBARSHI MONDAL	
3	3. Demonstration of Carapa plastron of turtle.	ace and	3	DEBARSHI MONDAL	
4	4. Identification of mammalian One herbivorous (Guinean one carnivorous (Dog) anim	pig) and	3	Dr. Sudipta Chakraborty	
5	5. Dissection of Tilapia: Cir system, Brain, purinogenital system.	culatory oituitary,	3	Dr. Sudipta Chakraborty	

ester IV (AY 2023-2024)	Period: Feb,2023		to July,2023	3
r: CC9T (Animal Physiology: Life	Full Marks: 55		Credit:4	
ning Systems) (Theory)				
TOPICS		CLASSES	Class taken	Remark
		ALLOTED	by	
Unit 1: Physiology of Digestion		8	DEBARSHI	
	r: CC9T (Animal Physiology: Life ning Systems) (Theory) TOPICS	r: CC9T (Animal Physiology: Life Full Maning Systems) (Theory) TOPICS	r: CC9T (Animal Physiology: Life Full Marks: 55 hing Systems) (Theory) TOPICS CLASSES ALLOTED	r: CC9T (Animal Physiology: Life hing Systems) (Theory) TOPICS CLASSES Class taken ALLOTED by

	Structural organisation and functions of Gastrointestinal tract and Associated glands; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes		MONDAL
2	Unit 2: Physiology of Respiration Mechanism of Respiration, Respiratory volumes and capacities, transport of Oxygen and Carbon dioxide in blood, Dissociation curves and the factors influencing it, respiratory pigments; Carbon monoxide poisoning	10	DEBARSHI MONDAL
3	Unit 3: Physiology of Circulation Components of Blood and their functions; Structure and functions of haemoglobin Haemostasis; Blood clotting system, Fibrinolytic system Haemopoiesis; Basic steps and its regulation Blood groups; ABO and Rh factor	8	DEBARSHI MONDAL
4	Unit 4: Physiology of Heart Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses Cardiac Cycle and cardiac output Blood pressure and its regulation	8	DEBARSHI MONDAL
5	Unit 5: Thermoregulation & Osmoregulation Physiological classification based on thermal biology. Thermal biology of endotherms Osmoregulation in aquatic vertebrates Extrarenal osmoregulatory organs in vertebrates	8	Dr. MANIDIP SHASMAL
6	Unit 6: Renal Physiology Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance	8	Dr. MANIDIP SHASMAL

Semester IV (AY 2023-2024)		Period: Feb,2023 to July,2023			3
Pape	Paper: CC9P (Animal Physiology: Life		Full Marks: 20 Credit:		it: 2
Sustai	ning Systems) (Practical)				
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	1. Determination of ABO Blood gro	up	3	DEBARSHI MONDAL	
2	Enumeration of red blood c white blood cells haemocytometer	ells and using	4	Dr. MANIDIP SHASMAL	
3	3. Estimation of haemoglobin Sahli's haemoglobinometer	_	3	DEBARSHI MONDAL	
4	4. Preparation of haeming haemochromogen crystals	n and	3	Dr. MANIDIP SHASMAL	
5	5. Recording of blood pressure sphygmomanometer	using a	3	Dr. MANIDIP SHASMAL	

Seme	ester IV (AY 2023-2024)	d: Period: Feb,2023 to July,2023			
` '		Iarks: 55 Credit:4			
(The		1 411 171	armoi 00	or cuit.	•
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Overview of Immune Syst Basic concepts of health and diseas Historical perspective of Immunolog and organs of the Immune system	es,	4	Dr. Sudipta Chakraborty	
2	Unit 2: Innate and Adaptive Imm Anatomical barriers, Inflammation, and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).		5	Dr. Sudipta Chakraborty	
3	Unit 3: Antigens Antigenicity and immunogenicity, Immunogens, Adjuvants and hapter Factors influencing immunogenicity T-Cell epitopes		4	Dr. Sudipta Chakraborty	
4	Unit 4: Immunoglobulins Structure and functions of different of immunoglobulins, Antigenainteractions, Immunoassays (ELISA and RIA), Hybroduction	antibody	8	Dr. Sudipta Chakraborty	
5	Unit 5: Major Histocomponent Complex Structure and functions of MHC modern Structure of T cell Receptor and its signalling, T cell development & selections of the selection of	olecules.	6	Dr. Sudipta Chakraborty	
6	Unit 6: Cytokines Types, properties and functions of cytokines.		5	Dr. MANIDIP SHASMAL	

7	Unit 7: Complement System Components and pathways of complement activation.	5	Dr. MANIDIP SHASMAL
8	Unit 8: Hypersensitivity Gell and Coombs' classification and brief description of various types of hypersensitivities.	5	Dr. MANIDIP SHASMAL
9	Unit 9: Immunology of diseases Malaria, Filariasis, Dengue and Tuberculosis	4	Dr. MANIDIP SHASMAL
10	Unit 10: Vaccines Various types of vaccines. Active & passive immunization (Artificial and natural).	4	Dr. MANIDIP SHASMAL

Semester IV (AY 2023-2024)		Perio	d: Feb,2023	to July,202	3	
Pape	er: CC10P (Immunology	Full I	Full Marks: 20 Cre		dit:2	
) (Pr	actical)					
Sl.	TOPICS		CLASSES	Class taken	Remark	
No.			ALLOTED	by		
1	1. Demonstration of lymphoid organs.		3	Dr. MANIDIP SHASMAL		
2	2. Histological study of spleen, thymus and lymph nodes through slides/photographs		4	DEBARSHI MONDAL		
3	3. Preparation of stained blood film to study various types of blood cells.		4	Dr. MANIDIP SHASMAL		
4	4. ABO blood group determination.		3	Dr. MANIDIP SHASMAL		
5	5. Demonstration of ELISA		2	Dr. MANIDIP SHASMAL		

Com	nator IV (AV 2022 2024)	and. Eab 2022 to July 2022			
	ester IV (AY 2023-2024) er: SEC2T (Sericulture)		od: Feb,2023 to July,2023 Marks: 55 Credit: 4		
(The		rull ľ	viai KS: 33	Crear	l. 4
Sl.	TOPICS	CLASSES	Class taken	Remark	
No.	101105	ALLOTED	by		
1	Unit 1: Introduction		10	DEBARSHI	
	Sericulture: Definition, history present status; Silk route	and		MONDAL	
	Types of silkworms, Distribution Races	n and			
	Exotic and indigenous races				
	Mulberry and non-mulberry Sericul	ture			
2	Unit 2: Biology of Silkworm		8	DEBARSHI	
	Life cycle of <i>Bombyx mori</i>			MONDAL	
	Structure of silk gland and secretion	of.			
	silk	101			
3	Unit 3: Rearing of Silkworms		12	DEBARSHI	
	Selection of mulberry variety establishment of mulberry garden	and		MONDAL	
	Rearing house and rearing appliance	es.			
	Disinfectants: Formalin, ble powder, RKO	aching			
	Silkworm rearing technology: Ear and Late age rearing	ly age			
	Types of mountages				
	Spinning, harvesting and storage of cocoons				
4	Unit 4: Pests and Diseases		12	Dr. Sudipta	
	Pests of silkworm: Uzi fly, der beetles and vertebrates	mestid		Chakraborty	
	Pathogenesis of silkworm dis Protozoan, viral, fungal and bacteria	seases:			
	Control and prevention of pests and diseases	d			
5	Unit 5: Entrepreneurship in Seric	ulture	8	Dr. MANIDIP	
	Prospectus of Sericulture in India: Sericulture industry in different state employment, potential in mulberry non-mulberry sericulture Visit to va	and		SHASMAL	

sericulture centres.		

Curriculum Plan (EVEN SEMESTER)
(Zoology GENERAL: CBCS)

	(Zoology GENERAL; CBCS)						
Sem	`			d: Feb,2023 to July,2023			
Pape	er: GE4T (Environment and	Full M	arks: 55	Credit: 4			
Public	Health) (Theory)						
Sl.	TOPICS		CLASSES	Class taken	Remark		
No.			ALLOTED	by			
1	Unit 1: Introduction		10	Dr. Sudipta Chakraborty			
	Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment.			Chaki aboi ty			
2	Unit 2: Climate Change Greenhouse gases and global warm Acid rain, Ozone layer destruction, of climate change on public health	•	10	Dr. MANIDIP SHASMAL			
3	Unit 3: Pollution Air, water, noise pollution sources a effects, Pollution control.	and	10	DEBARSHI MONDAL			
4	Unit 4: Waste Management Technology Sources of waste, types and characteristics, Sewage disposal and management, Solid waste disposal, Biomedical waste handling and disposal Nuclear waste handling and disposal Waste from thermal power plants.	d its	10	DEBARSHI MONDAL			
5	Unit 5: Diseases Causes, symptoms and control of tuberculosis, Asthma, Cholera, Min disease, typhoid, filariasis	amata	10	DEBARSHI MONDAL			

Semester IV (AY 2023-2024) Perio		Perio	d: Feb,2023	to July,2023	3
Paper: GE4P (Practical) Fu		Full Marks: 20		Credit: 2	
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	To determine pH, Cl, SO ₄ , NO ₃ in soil and		16	Dr. Sudipta	
	water samples from different locations.			Chakraborty	

Curriculum Plan (EVEN SEMESTER) Semester VI (Zoology Honours; CBCS) Poriod: Feb 2023 to

Semester VI (AY 2023-2024) Pe		Period: Feb,2023 to July,2023			
Pape	Paper: CC13T (Developmental Fi		Marks: 55	Credit:	4
Biolo	Biology) (Theory)				
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	Unit 1: Introduction		8	DEBARSHI	
	Basic concepts: Phases of Developm Cell cell interaction, Differentiation a			MONDAL	
	growth, Differential gene expression				
	growth, Emerchan gene expression	••			
2	Unit 2: Early Embryonic Develop	nent	12	DEBARSHI	
_	Gametogenesis, Spermatogenesis,			MONDAL	
	Oogenesis; Types of eggs, Egg				
	membranes; Fertilization (External a Internal): Changes in gametes, Block				
	polyspermy; Planes and patterns of	3 10			
	cleavage; Types of Blastula; Fate ma	ps			
	(including Techniques); Early	•			
	development of frog and chick up to				
	gastrulation; Embryonic induction ar	nd			
	organizers.				
3	Unit 3: Late Embryonic Developm	ent	10	Dr. Sudipta	
	Fate of Germ Layers; Extra-embryon			Chakraborty	
	membranes in birds; Implantation o			diamaborty	
	embryo in humans, Placenta (Structi	ure,			
	types and functions of placenta).				
4	Unit 4: Post Embryonic Developm	ent	10	Dr. MANIDIP	
1	Development of brain and Eye in	-		SHASMAL	
	Vertebrate. Regeneration: Modes of			GIIIGHAL	
	regeneration, epimorphosis, morpha				
	and compensatory regeneration (wi	th			
	one example each).				
5	Unit 5: Implications of Developm	nental	10	Dr. MANIDIP	
	Biology 8 Class		_ ~	SHASMAL	
			I		ı

Teratogenesis: Teratogenic agents and		
their effects on embryonic development;		
In vitro fertilization, Stem cell (ESC),		
Amniocentesis.		

Semester VI (AY 2023-2024)		Period: Feb,2023		to July,2023	
_	er: CC13P (Developmental	Full Mar	ks: 20	Credit: 2	
Biolog	gy) (Practical)			1	
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTE	by	
			D		
1			6	Dr. Sudipta	
	J	ounts of		Chakrabort	
	developmental stages through permanent slides:			у	
	streak (13 and 18 hours), 2				
	33, 36, 48, 72, and 96				
	incubation (Hamilton and I				
	stages).				
2	2. Study of the developmental		4	Dr.	
	life cycle of Drosophila f	rom stock		MANIDIP	
	culture.			SHASMAL	
3	3. Study of different sections of		3	DEBARSHI	
	(photomicropgraph/ slides).			MONDAL	
4		Drosophila	3	Dr.	
	culture/chick embryo devel	opment.		MANIDIP	
				SHASMAL	

Carre	o at on VII (AV 2022 2024)	. E.b. 2022	4- Il 2022		
	ester VI (AY 2023-2024)		: Feb,2023 arks: 55	to July,2023 Credit:4	
- ap		arks: 55	Credit:2	ť	
Biology) (Theory)		CLACCEC	Class tales	Damarla	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken	Remark
1	Unit-1: Life's Beginnings: Chemoge	nv RNΔ	4	by Dr. Sudipta	
1	world, Biogeny, Origin of photosyn	•	4	Chakraborty	
	volution of eukaryotes.	•		Chakraborty	
2	Unit-2: Historical review of Evolution	•	6	Dr. Sudipta	
	concepts, Lamarkism, Darwinism a Darwinism.	na Neo		Chakraborty	
	Dai Willism.				
3	Unit-3: Geological time scale, Fossi		5	Dr. Sudipta	
	of Hominids (from <i>Australopithacu</i>			Chakraborty	
	Homo sapiens), evolution of horse. theory of molecular evolution, Mo				
	clock.	ccaiai			
4	Unit-4: Sources of variations: Herit		5	Dr.	
	variations and their role in evolution	on.		MANIDIP	
				SHASMAL	
5	Unit-5: Population genetics: Hardy	-	8	Dr.	
	Weinberg Law (statement and deri			MANIDIP	
	of equation, application Of law to b			SHASMAL	
	Population); Evolutionary forces up H-W equilibrium; Natural selection	_			
	(concept of fitness, types of selecti				
	selection coefficient, mode of selec				
	heterozygous superiority).Genetic				
	mechanism (founder's effect, bottl phenomenon). Role of Migration a				
	Mutation in changing allele freque				
6	Unit-6: Species concept, Isolating mechanisms, modes of speciation. Adaptive radiation /macroevolution		4	Dr.	
				MANIDIP	
	(exemplified by Galapagos finches).			SHASMAL	
			_	-	
7	Unit-7: Extinctions, Back ground ar extinctions (causes and effects), de		5	Dr.	
	Camedons (causes and effects), de	. canca		MANIDIP	

	example of K-T extinction.		SHASMAL
8	Unit-8: Origin and Evolution of Man, Unique Hominin characteristics contrasted with primate characteristic Molecular analysis of human origin.	6	Dr. Sudipta Chakraborty
9	Unit-9: Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Convergent & Divergent evolution.	7	Dr. Sudipta Chakraborty

Semester V (AY 2023-2024)		Period	l: Feb,2023	to July,2023	
Paper: CC14P (Evolutionary Biology		Full M	arks: 20	Credi	t:2
) (Practical)					
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1			4	DEBARSHI	
	1. Study of fossils from pictures	models/		MONDAL	
	pictures				
2	2. Study of homology and	analogy	4	DEBARSHI	
	from suitable specimens			MONDAL	
3	3. Study and verification of	•	4	Dr.	
	Weinberg Law by chi	square		MANIDIP	
	analysis			SHASMAL	
4	4. Graphical representatio		4	Dr.	
	interpretation of data of			MANIDIP	
	weight of a sample of 100 in relation to their age and			SHASMAL	
	in relation to their age und	2211			

Sem	Semester VI (AY 2023-2024) Period:		Feb,2023	to July,2023	
	er: DSE3 (Parasitology)	Full Ma	ırks: 55	Credit:4	
_	eory)		1	ı	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit-1: Introduction to Parasit Brief introduction of Parasitism, Parasitoid and Vectors (mechani biological vector Host parasite relationship	Parasite,	6	Dr. Sudipta Chakraborty	
2	Unit-2: Parasitic Protists Study of Morphology, Life Cycle, Prevalence, Epidemiology, Patho Diagnosis, Prophylaxis and Treat Giardia intestinalis, Trypanosom gambiense, Leishmania donovar	ogenicity, ment of a	12	Dr. Sudipta Chakraborty	
3	Unit-3: Parasitic Platyhelminthes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of Schistosoma haematobium, Taenia sajinata		8	Dr. Sudipta Chakraborty	
4	Unit-4: Parasitic Nematodes Study of Morphology, Life Cycle, Prevalence, Epidemiology, Patho Diagnosis, Prophylaxis and Treat Ascaris lumbricoides, Ancylostor duodenale, Wuchereria bancroft Trichinella spiralis, Brugia malay Nematode plant interaction; Gal formation.	ogenicity, ment of ma ii and ri;	11	Dr. MANIDIP SHASMAL	
5	Unit-5: Parasitic Arthropods Biology, importance and control (Soft tick Ornithodoros, Hard tick mites (Sarcoptes), Lice (Pediculu (Xenopsylla) and Bug (Cimex).	k Ixodes),	7	Dr. Sudipta Chakraborty	
6	Unit-6: Parasite Vertebrates Brief account of Cookicutter Sha Mocking bird, Vampire bat.	rk, Hood	6	Dr. Sudipta Chakraborty	

Semester VI (AY 2023-2024)	Period: Feb,2023	to July,2023
Paper: DSE3 (Parasitology)	Full Marks: 20	Credit:2
(Practical)		

Sl.	TOPICS	CLASSES	Class taken	Remark
No.	TOTICS	ALLOTED	by	INCIIIAI K
1	1. Study of life stages of Giardia intestinalis, Trypanosoma gambiense, Leishmania donovani through permanent slides/micro photographs.	3	DEBARSHI MONDAL	
2	2. Study of adult and life stages of Schistosoma haematobium, Taenia sajinata through permanent slides/micro photographs.	2	Dr. Sudipta Chakraborty	
3	3. Study of adult and life stages of Ancylostoma duodenale, Brugia malayi and Trichinella spiralis through permanent slides/micro photographs.	2	Dr. Sudipta Chakraborty	
4	4. Study of plant parasitic root knot nematode, Meloidogyne from the soil sample.	2	Dr. Sudipta Chakraborty	
5	5. Study of <i>Pediculus humanus</i> , <i>Xenopsylla cheopis</i> and <i>Cimex lectularius</i> through permanent slides/ photographs.	2	Dr. Sudipta Chakraborty	
6	6. Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry].	2	Dr. Sudipta Chakraborty	
7	7. Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product. Submission of a brief report on parasitic vertebrates.	3	Dr. Sudipta Chakraborty	

Semester VI (AY 2023-2024)	Period:	Feb,2023	to July,2023	
Paper: DSE4 (Wild Life	Full Mar	rks: 55	Credit:4	
Conservation and Management)				
(Theory)				
Sl. TOPICS		CLASSES	Class taken	Remark

No.		ALLOTED	by
1	Unit-1: Introduction to Wild Life Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.	5	Dr. Sudipta Chakraborty
2	Unit-2: Evaluation and management of wild life Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation. Standard evaluation procedures: remote sensing and GIS.	6	Dr. Sudipta Chakraborty
3	Unit-3: Management of habitats Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity Restoration of degraded habitats.	6	Dr. Sudipta Chakraborty
4	Unit-4: Population estimation Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.	6	Dr. MANIDIP SHASMAL
5	Unit-5: Aims and objectives of wildlife conservation Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; insitu conservation and ex-situ conservation: necessity for wildlife conservation.	8	DEBARSHI MONDAL
6	Unit-6: Management planning of wild life in protected areas Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbence.	8	Dr. MANIDIP SHASMAL
7	Unit-7: Man and Wildlife Causes and consequences of human- wildlife conflicts; mitigation of conflict – an overview; Management of excess population.	5	Dr. MANIDIP SHASMAL
8	Unit-8: Protected areas National parks & sanctuaries, Community reserve; Important features of protected	6	DEBARSHI MONDAL

areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.			
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Sem	ester VI (AY 2023-2024)	Period	d: Feb,2023	to July,202	3
	er: DSE4 (Wild Life		arks: 20	Credi	
Cons	servation and Management				
) (Pr	actical)				
Sl.	TOPICS		CLASSES	Class taken	Remark
No.			ALLOTED	by	
1	List of Practical 1. Identification of flora, mammalia avian fauna, herpeto-fauna.	n fauna,	3	DEBARSHI MONDAL	
2	Binoculars, Spotting scope	ompass, e, Range	3	DEBARSHI MONDAL	
3	3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.		3	Dr. MANIDIP SHASMAL	
4	Demonstration of different techniques for flora and fau		2	Dr. MANIDIP SHASMAL	
5	5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.		3	Dr. Sudipta Chakraborty	
6	6. Trail / transect monitor abundance and control estimation of mammals and (direct and indirect evidence)	liversity and bird	2	Dr. Sudipta Chakraborty	

Curriculum Plan (ODD SEMESTER)

Semester I

(Zoology Hons; CBCS)

Semes	, ,,	Period · July	,,2023 to Jan, 202	4
		Full Marks:55	Credit:4	т
Sl. No.	TOPICS	CLASSES	Class taken by	Remark
1	Unit 1: Basics of Animal Classification	ALLOTED 4	DEBARSHI	
	Definitions: Classification, Systematics an Taxonomy; Taxonomic Hierarchy, Taxonomic types	ad	MONDAL	
	Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom			
	concept of classification (Card woese)			
2	Unit 2: Protista and Metazoa	15	DEBARSHI	
	Protozoa		MONDAL	
	General characteristics and Classification to phylum (according to Levine et. al., 198 Locomotion			
	in Euglena, Paramoecium and Amoeba; Conjugation in Paramoecium.			
	Life cycle and pathogenicity of <i>Plasmodiu</i> vivax and <i>Entamoeba histolytica</i>	ım		
	Metazoa			
	Evolution of symmetry and segmentation Metazoa	of		
3	Unit 3: Porifera	6	DEBARSHI	
	General characteristics and Classification u classes; Canal system and spicules in spong	-	MONDAL	
4	Unit 4: Cnidaria	10	Dr. SUDIPTA	
	General characteristics and Classification to classes Metagenesis in <i>Obelia& Aurelia</i>	up	CHAKRABORTY	
	Metagenesis in Obelia			
	Polymorphism in Cnidaria			
	Corals and coral reef diversity, function & conservation			
5	Unit 5: Ctenophora	2	Dr. SUDIPTA	
	General characteristics		CHAKRABORTY	
6	Unit 6: Platyhelminthes	6	Dr. SUDIPTA	

	General characteristics and Classification up to classes Life cycle and pathogenicity and control measures of Fasciola hepatica and Taenia solium		CHAKRABORTY	
7	Unit 7: Nematoda General characteristics and Classification up to classes Life cycle, and pathogenicity and control measures of Ascaris lumbricoides and Wuchereria bancrofti Parasitic adaptations in helminthes	7	Dr. MANIDIP SHASMAL	

Seme	Semester I (AY 2023-2024)		d : July,	2023 to Jan, 2024	•
Paper: C1 P1 –Non-Chordates I (Practical)		Full Ma	arks: 20	Credit:2	
Sl. No.	TOPICS	•	CLASSES ALLOTED	Class taken by	Remark
1	1. Study of whole mount of <i>Euglena</i> , <i>Amo</i> and <i>Paramoecium</i>	peba	3	DEBARSHI MONDAL	
2	2. Identification of Amoeba, Euglena, Entamoeba, Opalina, Paramecium, Plasm vivax and Plasmodium falciparum (from t prepared slides)		4	DEBARSHI MONDAL	
3	3. Identification of Sycon, Neptune's Cup. Obelia, Physalia, Millepora, Aurelia, Tub Corallium, Alcyonium, Gorgonia, Metridi Pennatula, Fungia, Meandrina, Madrepor	ipora, um,	3	DEBARSHI MONDAL	
4	4. Identification and significance of adult Fasciola hepatica, Taenia solium and Asc lumbricoides	aris	3	Dr. MANIDIP SHASMAL	
5	5. Staining/mounting of any protozoa/helr from gut of cockroach	ninth	3	Dr. SUDIPTA CHAKRABORTY	

Semester I (AY 2023-2024)		Period: July,2023 to Jan, 2024			
Paper	Paper: C2 T–Ecology (Theory)		arks:55	Credit:4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to Ecology History of ecology, Autecology and synecology, Levels of organization, Law limiting factors, Study of Physical factors, The Biosphere	vs of	4	Dr. MANIDIP SHASMAL	

2	Unit 2: Population	20	Dr. MANIDIP
	Unitary and Modular populations		SHASMAL
	Unique and group attributes of population: Demographic factors, life tables, fecundity tables,		
	survivorship curves, dispersal and dispersion.		
	Geometric, exponential and logistic growth, equation and patterns, r and K strategies Population		
	regulation - density-dependent and independent factors		
	Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation		
	for competition.		
3	Unit 3: Community	11	Dr. SUDIPTA
	Community characteristics: species diversity, abundance, , dominance, richness,		CHAKRABORTY
	Vertical stratification, Ecotone and edge effect. Ecological succession with one example		
4	Unit 4: Ecosystem	10	DEBARSHI MONDAL
	Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains,		MONDAL
	Linear		
	and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and		
	Ecological efficiencies		
	Nutrient and biogeochemical cycle with an example of Nitrogen cycle		
	Human modified ecosystem		
5	Unit 5: Applied Ecology	5	DEBARSHI
	Wildlife Conservation (in-situ and ex-situ conservation).		MONDAL
	Management strategies for tiger conservation; Wild life protection act (1972)		

		Period: July,2023 to Jan, 2024			
		Full Marks: 20 Credit: 2			
Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark	
1	Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided	1	DEBARSHI MONDAL		
2	2. Determination of population density in a natural/hypothetical community by quadra method and calculation of Shannon-Weine diversity index for the same community	ite	Dr. MANIDIP SHASMAL		
3	3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determinat of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO ₂	ion 6	Dr. SUDIPTA CHAKRABORTY		
4	4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuar	у 1	Dr. SUDIPTA CHAKRABORTY		

Curriculum Plan (ODD SEMESTER) Semester III (Zoology Honours; CBCS)

Semester III (AY 2023-2024)		Period : July,2023 to Jan, 2024			
Paper	Paper: CC-5: Chordates (Theory)		arks:55	Credit:4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to Chordates General characteristics and outline classification of Phylum Chordata		5	DEBARSHI MONDAL	
2	Unit 2: Protochordata General characteristics and classification sub-phylum Urochordata and	n of	5	DEBARSHI MONDAL	

	Cephalochordata up to Classes. Retrogressive metamorphosis in <i>Ascidia</i> . Chordate Features and Feeding in <i>Branchiostoma</i>		
3	Unit 3: Origin of Chordata Dipleurula concept and the Echinoderm theory of origin of chordates Advanced features of vertebrates over Protochordata	5	DEBARSHI MONDAL
4	Unit 4: Agnatha General characteristics and classification of cyclostomes up to order	4	DEBARSHI MONDAL
5	Unit 5: Pisces General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses Accessory respiratory organ, migration and parental care in fishes Swim bladder in fishes. Classification up to Sub-Classes	6	DEBARSHI MONDAL
6	Unit 6: Amphibia General characteristics and classification up to living Orders. Metamorphosis and parental care in Amphibia	5	DEBARSHI MONDAL
7	Unit 7: Reptilia General characteristics and classification up to living Orders. Poison apparatus and Biting mechanism in Snake	5	Dr. MANIDIP SHASMAL
8	Unit 8: Aves General characteristics and classification up to Sub-Classes Exoskeleton and migration in Birds Principles and aerodynamics of flight	5	Dr. MANIDIP SHASMAL
9	Unit 9: Mammals General characters and classification up to living orders Affinities of Prototheria Exoskeleton derivatives of mammals Adaptive radiation in mammals with reference to locomotory appendages Echolocation in Micro chiropterans and Cetaceans	6	Dr. SUDIPTA CHAKRABORTY
10	Unit 10: Zoogeography Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in	4	Dr. SUDIPTA CHAKRABORTY

different realms		

Semester III (AY 2023-2024) Per			od : July	y,2023 to Jan, 202	4
Paper: C5P: Chordates Lab (Practical) Full Marks: 20 Credit: 2					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Protochordata Balanoglossus, Herdmania, Branchiosto	та	2	DEBARSHI MONDAL	
2	2. Agnatha Petromyzon, Myxine		2	DEBARSHI MONDAL	
3	3. Fishes Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labe Exocoetus, Echeneis, Anguilla, Hippocam Tetrodon/ Diodon, Anabas, Flat fish		2	DEBARSHI MONDAL	
4	4. Amphibia Necturus, Bufo, Hyla, Alytes, Axolotl, Tylototriton		2	Dr. MANIDIP SHASMAL	
5	5. Reptilia Chelone, Trionyx, Hemidactylus, Varanus Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophi Zamenis, Crocodylus. Key for Identificatio of poisonous and non-poisonous snakes	s,	2	Dr. MANIDIP SHASMAL	
6	6. Mammalia: Bat (Insectivorous and Frugivorous), <i>Funambulus</i>		2	Dr. SUDIPTA CHAKRABORTY	
7	7. Pecten from Fowl head		2	Dr. SUDIPTA CHAKRABORTY	
8	8. Dissection of brain and pituitary of Til	•	1	Dr. SUDIPTA CHAKRABORTY	
9	9. Power point presentation on study of a two animals from two different classes by students (may be included if dissections a given permission)	y	1	Dr. SUDIPTA CHAKRABORTY	

Semester III (AY 2023-2024) Pe		Period: July,2023 to Jan, 2024			4
Paper: CC-6: Animal Physiology: Controlling Ful		Full Ma	arks: 55	Credit: 4	
	ordinating Systems (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Tissues		8	Dr. MANIDIP	
	Structure, location, classification and			SHASMAL	
	functions of epithelial tissue, connective			OIN IOI III L	
	tissue, muscular tissue and nervous tissue	9			
	and, fixation and staining of tissues.				
2	Unit 2: Bone and Cartilage		8	Dr. SUDIPTA	
	Structure and types of bones and cartilag	es,		CHAKRABORTY	
	Ossification			011111111111111111111111111111111111111	
3	Unit 3: Nervous System		8	Dr. MANIDIP	
	Structure of neuron, resting membrane potential, Origin of action potential and its			SHASMAL	
	propagation across the myelinated and				
	unmyelinated nerve fibers; Types of syna				
	Synaptic transmission and Neuromuscula	r			
	junction; Reflex action and its types				
4	Unit 4: Muscular system		8	Dr. SUDIPTA	
	Histology of different types of muscle; Ul			CHAKRABORTY	
	structure of skeletal muscle; Molecular a	na			
	chemical basis of muscle contraction;				
5	Characteristics of muscle fibre		8	DEDADCIII	
5	Unit 5: Reproductive System Histology of testis and ovary		0	DEBARSHI	
	Physiology of Reproduction			MONDAL	
6	Unit 6: Endocrine System		10	DEBARSHI	
O	Histology and function of pituitary, thyroi	id.	10	=	
	pancreas and adrenal	,		MONDAL	
	Classification of hormones; Mechanism o	f			
	Hormone action				
	Signal transduction pathways for Steroida	l and			
	Non steroidal hormones				
	Hypothalamus (neuroendocrine gland) -				
	principal nuclei involved in neuroendocrin				
	control of anterior pituitary and endocrine	;			
	system				
	Placental hormones				

Seme	ster III (AY 2023-2024)	Period	l : July,2	023 to Jan, 2024	
Paper: C6P: Animal Physiology: Controlling		Full Mai	rks: 20	Credit: 2	
& Coc	ordinating Systems Lab (Practical)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Recording of simple muscle twitch velectrical stimulation (or Virtual)	vith	3	Dr. SUDIPTA CHAKRABORTY	
2	2. Demonstration of the unconditioned	reflex	3	Dr. SUDIPTA	

	action (Deep tendon reflex such as knee jerk reflex)		CHAKRABORTY	
3	3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells	3	Dr. MANIDIP SHASMAL	
4	4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid	3	DEBARSHI MONDAL	
5	5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/white rat) tissues	4	DEBARSHI MONDAL	

			l : July,2	023 to Jan, 2024	
•			rks: 55	Credit: 4	
(Theo				1	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Carbohydrates		8	Dr. MANIDIP	
	Structure and Biological importance:			SHASMAL	
	Monosaccharides, Disaccharides,				
	Polysaccharides; Derivatives of				
	Monosachharides				
	Carbohydrate metabolism: Glycolysis, (Citric			
	acid cycle, Pentose phosphate pathway	<i>I</i> ,			
	Gluconeogenesis				
2	Unit 2: Lipids		8	Dr. MANIDIP	
	Structure and Significance: Physiol	ogically		SHASMAL	
	important saturated and unsaturate	d fatty		JIIAJWAL	
	acids, Tri-acylglycerols, Phosph	olipids,			
		Steroids,			
	Eicosanoids and terpinoids.				
	Lipid metabolism: β-oxidation of fatty a	acids;			
	Fatty acid biosynthesis				
3	Unit 3: Proteins		8	Dr. MANIDIP	
	Amino acids			SHASMAL	
	Structure, Classification, General and				
	chemical properties of α-amino	acids;			
	Physiological importance of essential a	nd non-			
	essential amino acids				
	Proteins I	1C			
	Bonds stabilizing protein structure; Lo	eveis of			
	organization Protein metabolism: Transamination,				
	Deamination, Urea cycle, Fate of C-skel	loton of			
	Glucogenic and Ketogenic amino acids	וכנטוו טו			
4	Unit 4: Nucleic Acids		10	D. CHDIDTA	
4		nidines,	10	Dr. SUDIPTA	
	Nucleosides, Nucleotides, Nucleic acid			CHAKRABORTY	
	Types of DNA and RNA, Complement				
	DNA, Hpyo- Hyperchromaticity of DN	•			
	Basic concept of nucleotide metabolism				
	Basis concept of madicodiac micrabolish	• •	l	L	l

5	Unit 5: Enzymes Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action- Catalytic and Regulatory (Basic concept with one example each)	10	DEBARSHI MONDAL	
6	Unit 6: Oxidative Phosphorylation Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System	6	Dr. SUDIPTA CHAKRABORTY	

Seme	ster III (AY 2023-2024)	Period: July,2023 to Jan, 2024			
Paper: C7P: Fundamentals of Biochemistry Lab (Practical)			Marks: 20	Credit: 2	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Qualitative tests of functional graph in carbohydrates, proteins and leading to the carbohydrates.		3	DEBARSHI MONDAL	
2	Paper chromatography of amino acids.		3	DEBARSHI MONDAL	
3	3. Quantitative estimation of Lowry Methods	y	3	Dr. MANIDIP SHASMAL	
4	4. Demonstration of proteins separately SDS-PAGE.	ation	2	Dr. MANIDIP SHASMAL	
5	5. To study the enzymatic activity of Trypsin and Lipase.	of	2	Dr. MANIDIP SHASMAL	
6	6. To perform the Acid and Alkalir phosphatase assay from serum/tissue.		3	Dr. SUDIPTA CHAKRABORTY	

Semester III (AY 2023-2024)		Period :]	July,202	23 to Jan, 2024	
Paper: SEC1: Apiculture (Theory) Full Marks		Full Marks:	: 55	Credit: 4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biology of Bees		10	Dr. SUDIPTA	
	History, Classification and Biology o	f Honey		CHAKRABORTY	
	Bees			ommund om 1	
	Social Organization of Bee Colony				
2	Unit 2: Rearing of Bees		10	Dr. SUDIPTA	
	Artificial Bee rearing (Apiary), Beehi	ives –		CHAKRABORTY	
	Newton and Langstroth				
	Bee Pasturage				
	Selection of Bee Species for Apicultu	ire			
	Bee Keeping Equipment				
	Methods of Extraction of Honey (Indi	genous			
2	and Modern)		1.0	D = D 4 D 6444	
3	Unit 3: Diseases and Enemies		10	DEBARSHI	
	Bee Diseases and Enemies			MONDAL	
4	Control and Preventive measures		10	DED A DOLLA	
4	Unit 4: Bee Economy	.	10	DEBARSHI	
	Products of Apiculture Industry and i			MONDAL	
-	(Honey, Bees Wax, Propolis), Pollen e		10	D 141111D15	
5	Unit 5: Entrepreneurship in Ap		10	Dr. MANIDIP	
	Bee Keeping Industry – Recent Effort			SHASMAL	
	Methods in employing artificial. Beeh				
	cross pollination in horticultural gard	ens			

Semester III (AY 2023-2024)		Period : July,2023 to Jan, 2024			
Paper	: GE-3: Aquatic Biology (Theory)	Full Marks: 55 Credit: 4			
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	UNIT 1: Aquatic Biomes Brief introduction of the aquatic biomes Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine ber zone and coral reefs.	l	12	DEBARSHI MONDAL	
2	UNIT 2: Freshwater Biology Lakes: Origin and classification, Lake Ecosystem, Lake morphometry, Phenemical Characteristics: Light, Temper Thermal stratification, Dissolved Carbonate, Bicarbonates, Phosphate Nitrates, Turbidity; Dissolved gases (of carbon dioxide). Nutrient Cycles in Nitrogen, Sulphur and Phosphorous. Streams: Different stages of stream development, Physico-chemical environal Adaptation of hill-stream fishes.	ysico— erature, Solids, s and xygen, Lakes-	13	DEBARSHI MONDAL	

3	UNIT 3: Marine Biology Salinity and density of Sea water, Continental shelf, Adaptations of deep sea organisms, Coral reefs, Sea weeds.	12	Dr. SUDIPTA CHAKRABORTY	
4	UNIT 4: Management of Aquatic Resources Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage treatment Water quality assessment- BOD and COD.	13	Dr. MANIDIP SHASMAL	

Semes	ster III (AY 2023-2024)	Period : Ju	ly,2023 to Jan, 2024	ŀ
Paper	: GE3 P: Aquatic Biology Lab (Practical)	Full Marks: 2	Credit: 2	
Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	Determine the area of a lake us graphimetric and gravime method.	-	DEBARSHI MONDAL	
2	 Identify the important macrophy phytoplanktons and zooplankt present in a lake ecosystem. 		DEBARSHI MONDAL	
3	3. Determine the amount Turbidity/transparency, Dissol oxygen, carbon dioxide, alkalin (carbonates & bicarbonates) water collected from a nearby lawater body.	nity in	Dr. MANIDIP SHASMAL	
4	4. Instruments used in limnol (Secchi disc, Van Dorn Bo Conductivity meter, Turbic meter, PONAR grab sampler) their significance.	ttle, dity and	Dr. SUDIPTA CHAKRABORTY	
5	5. A Project Report on a visit to Sewage treatment plant/Man bioreserve/ Fisheries Institutes		Dr. SUDIPTA CHAKRABORTY	

Curriculum Plan (ODD SEMESTER) Semester V

	(Zoology H					
Semes	ster V (AY 2023-2024)	Perioc	l : July,2()23 to Jan	ı, 2024	
Paper	: CC-11: Molecular Biology (Theory)	Full Mai	rks: 55	Cred	lit: 4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by		Remark
1	Unit 1: Nucleic Acids		5	Dr. SUDIF	РΤΑ	
	Salient features of DNA and RNA. Watson	n and		CHAKRAE		
	Crick Model of DNA			CHARRAI	JUNTI	
2	Unit 2: DNA Replication		8	DEBARSE	ΗI	
	Mechanism of DNA Replication in Prokar	yotes,		MONDAL		
	Semi-conservative, bidirectional and					
	discontinuous Replication, RNA priming,					
2	Replication of telomeres		0	D 011D1D	NTI 4	
3	Unit 3: Transcription Mechanism of Transcription in prokaryot	oc and	8	Dr. SUDIP		
	eukaryotes, Transcription factors, Differe			CHAKRAE	30RTY	
	between prokaryotic and eukaryotic	ince				
	transcription					
4	Unit 4: Translation		8	Dr. MANI	DID	
-	Mechanism of protein synthesis in proka	ryotes,	· ·			
	Ribosome structure and assembly in	, ,		SHASMAI	_	
	prokaryotes, fidelity of protein synthesis,	,				
	aminoacyl tRNA synthetases and chargin	g of				
	tRNA; Proteins involved in initiation, elor	ngation				
	and termination of polypeptide chain; Ge	enetic				
	code, Degeneracy of the genetic code an					
	Wobble Hypothesis; Inhibitors of protein					
	synthesis; Difference between prokaryot	ic and				
	eukaryotic translation	• .•	_			
5	Unit 5: Post Transcriptional Modif and Processing of Eukaryotic RNA	ications	5	Dr. MANI		
	Capping and Poly A tail formation in mRN	IA · Snlit		SHASMAI		
	genes: concept of introns and exons, spli					
	mechanism, alternative splicing, exon shi					
	and RNA editing, Processing of tRNA					
6	Unit 6: Gene Regulation		5	DEBARSH	HI .	
	Regulation of Transcription in prokaryo	otes: lac		MONDAL		
	operon and trp operon;			חשמויוסויי		
	Regulation of Transcription in eukaryotes					
	Activators, enhancers, silencer, represso					
	miRNA mediated gene silencing, Genetic					
7	imprinting		-	D 1513	D.I.D.	
7	Unit 7: DNA Repair Mechanisms	n	5	Dr. MANI		
	Types of DNA repair mechanisms, RecBC model in prokaryotes, nucleotide and ba			SHASMAI	_	
	excision repair, SOS repair	SC				
8	Unit 8: Molecular Techniques		6	Dr. MANI	DID	
J	PCR, Western and Southern blot, Northe	rn Blot.	3			
		2.00,		SHASMAL	_	
	Sanger DNA sequencing	rn Biot,		SHASMAI	_	

Semes	Semester V (AY 2023-2024) Po		Period: July,2023 to Jan, 2024		
Paper	: C11P: Molecular Biology (Practical)	Full Ma	arks: 20	Credit:2	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Demonstration of polyten lampbrush chromosome photograph	e and from	5	DEBARSHI MONDAL	
2	Isolation and quantification genomic DNA spectrophotometer measurement)	on of using (A260	5	Dr. SUDIPTA CHAKRABORTY	
3	3. Agarose gel electrophores DNA	sis for	6	Dr. MANIDIP SHASMAL	

Semester V (AY 2023-2024) Period:			July,2023 to Jan, 2024		
Paper	: CC-12: Genetics (Theory)	Full Marks	:: 55	Credit: 4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Mendelian Genetics and its Ex	xtension	8	DEBARSHI	
	Principles of inheritance, Incomplete			MONDAL	
	dominance and co-dominance, Epistasi				
	Multiple alleles, Lethal alleles, Pleiotrop	oy, Sex-			
	linked, sex- influenced and sex-limited				
	inheritance, Polygenic Inheritance				
2	Unit 2: Linkage, Crossing Ov	er and	8	DEBARSHI	
	Chromosomal Mapping	_		MONDAL	
	Linkage and Crossing Over, molecular b				
	crossing over, Measuring Recombination				
	frequency and linkage intensity using the				
	factor crosses, Interference and coincid	lence			
3	Unit 3: Mutations		8	Dr. SUDIPTA	
	Types of gene mutations (Classification			CHAKRABORTY	
	of chromosomal aberrations (Classificat				
	with one suitable example of each), No				
	disjunction and variation in chromosom				
	number; Molecular basis of mutations i				
	relation to UV light and chemical mutag	gens			
4	Unit 4: Sex Determination		8	Dr. SUDIPTA	
	Mechanisms of sex determination in <i>Dr</i>	rosophila		CHAKRABORTY	
	Sex determination in mammals				
	Dosage compensation in <i>Drosophila</i> & I		_		
5	Unit 5: Extra-chromosomal Inheritan		5	Dr. MANIDIP	
	Criteria for extra chromosomal inherita	· ·		SHASMAL	
	Antibiotic resistance in <i>Chlamyadomon</i>				
	Kappa particle in Paramoecium Shell sp	iralling			

	in snail		
6	Unit 6: Recombination in Bacteria and Viruses Conjugation, Transformation, Transduction, Complementation test in Bacteriophage	7	Dr. MANIDIP SHASMAL
7	Unit 7: Transposable Genetic Elements Transposons in bacteria, Ac-Ds elements in maize and P elements in <i>Drosophila</i> , LINE, SINE, Alu elements in humans	6	DEBARSHI MONDAL

Semester V (AY 2023-2024)		Period: July,2023 to Jan, 2024			
Paper	: C12P: Genetics (Practical)	Full Ma	arks: 20	Credit: 2	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Chi-square analyses		5	Dr. SUDIPTA CHAKRABORTY	
2	2. Linkage maps based on conjugation		3	Dr. MANIDIP SHASMAL	
3	3. Identification of chromosomal aberra Drosophila and man from photograph	tion in	3	DEBARSHI MONDAL	
4	4. Pedigree analysis of some human in traits	herited	5	DEBARSHI MONDAL	

Semester V (AY 2023-2024) Perio		riod : July,2023 to Jan, 2024			
Paper	Paper: DSE-1: Reproductive Biology Full M		arks: 55	Credit: 4	
(Theo	ory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Reproductive Endocrinology Mechanism of action of steroids glycoprotein hormones. hypothalar hypophyseal – gonadal axis, regulat gonadotrophin secretion in human (ma female) Reproductive system: Development and differentiation of go	s and mo – ion of lle and	12	DEBARSHI MONDAL	
2	genital ducts and external genitalia Unit 2: Functional anatomy of male reproduction Histoarchitechture of teshuman; Spermatogenesis; Kinetics and hormonal regulation; Androgen synthe and metabolism; Accessory glands func	sis	12	Dr. MANIDIP SHASMAL	
3	Unit 3: Functional anatomy of 1 reproduction	female	14	Dr. SUDIPTA CHAKRABORTY	

	Histoarchitechture of ovary in human; Oogenesis; Kinetics and hormonal regulation; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (human) and their regulation, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its Regulation			
4	Unit 4: Reproductive Health Infertility in male and female: causes, diagnosis and management Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization Modern contraceptive technologies	12	Dr. SUDIPTA CHAKRABORTY	

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Seme	Semester V (AY 2023-2024) Period : July,2023 to Jan, 2024				•
Paper	: DSE1P: Reproductive Biology	Full I	Marks: 20	Credit: 2	
(Pract					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of animal house: set up maintenance of animal house, bre techniques, care of normal and experimanimals.	eding	4	Dr. SUDIPTA CHAKRABORTY	
2	2. Examination of vaginal smear rats live animals.	from	2	Dr. MANIDIP SHASMAL	
3	3. Tissue fixation, embedding in par microtomy and slide preparation of endocrine gland		5	DEBARSHI MONDAL	
4	4. Examination of histological sections photomicrographs/ permanent slides rat/human: testis, epididymis and acce glands of male reproductive sys Sections of ovary, fallopian tube, u (proliferative and secretory stages), of and vagina.	s of ssory tems; iterus		Dr. MANIDIP SHASMAL	
5	5. Sperm count and sperm motility in rat	t	1	Dr. MANIDIP SHASMAL	

Semes	ster V (AY 2023-2024)	Period : Jul	y,2023	to Jan, 2024	
Paper	: DSE-2: Animal Biotechnology	Full Marks:	55	Credit: 4	
(Theo	ry)				
Sl. No.	TOPICS		CLASSES	Class taken by	Remark
			ALLOTED		
1	Unit 1: Introduction		8	Dr. MANIDIP	
	Organization of prokaryotic and e	ukaryotic		SHASMAL	
	genome, Concept of genomics				
2	Unit 2: Molecular Techniqu	ies in Gene	17	Dr. SUDIPTA	

	manipulation Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics).Restriction enzymes: Nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization Southern, Northern and Western blotting DNA sequencing: Sanger method		CHAKRABORTY	
	Polymerase Chain Reaction, DNA Finger Printing and DNA micro array			
3	Unit 3: Genetically Modified Organisms Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock out mice	15	Dr. MANIDIP SHASMAL	
4	Unit 4: Culture Techniques and Applications Animal cell culture, expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia)	10	DEBARSHI MONDAL	

Seme	Semester V (AY 2023-2024) Period			d : July,2023 to Jan, 2024		
Paper	: DSE2P (Animal Biotechnology	Full Mar	ks: 20	Credit: 2		
) (Pra	ctical)					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark	
1	1. Genomic DNA isolation from <i>E. coli</i>		2	DEBARSHI MONDAL		
2	2. Plasmid DNA isolation (pUC 18/19) coli	from <i>E</i> .	2	Dr. SUDIPTA CHAKRABORTY		
3	3. Restriction digestion of plasmid DNA.		2	Dr. SUDIPTA CHAKRABORTY		
4	4. Construction of circular and linear remap from the data provided.	estriction	3	Dr. SUDIPTA CHAKRABORTY		
5	5. Calculation of transformation efficier the data provided.	ncy from	2	Dr. MANIDIP SHASMAL		
6	6. To study following techniques photographs a. Southern Blotting b. Northern Blotting c. Western Blotting d. DNA Sequencing (Sanger's Method) e. PCR f. DNA fingerprinting 7. Project report on animal cell culture	through	4	Dr. MANIDIP SHASMAL		

7	7. Project report on animal cell culture	1	Dr. MANIDIP	
			SHASMAL	

$\begin{array}{c} \textbf{Curriculum Plan (ALL SEMESTER)} \\ \textbf{Semester I} \end{array}$

(Zoology General; CBCS)

Semes	ster I (AY 2023-2024)	eb,2023	to July,2023		
Paper: DSC-1A (Animal Diversity) Full Mark				Credit:4	
(Theo	ry)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Kingdom Protista		4	DEBARSHI	
	General characters and classification	up to		MONDAL	
	classes; Locomotory Organelles and			MONDAL	
	locomotion in Protozoa				
2	Unit 2: Phylum Porifera		3	DEBARSHI	
	General characters and classification	up to		MONDAL	
	classes; Canal System in Sycon	•		MONDAL	
3	Unit 3: Phylum Cnidaria		3	DEBARSHI	
	Conoral characters and classification	un to		MONDAL	
	General characters and classification classes; Polymorphism in Hydrozoa	up to			
	classes, rolymorphism in riyarozoa				
4	Unit 4: Phylum Platyhelminthes		3	DEBARSHI	
	General characters and classification	up to	J	MONDAL	
	classes; Life history of Taenia solium			MONDAL	
5	Unit 5: Phylum Nemathelminthes		3	DEBARSHI	
	General characters and classification	up to		MONDAL	
	classes; Life history of Ascaris lumbric	•		MUNDAL	
	and its parasitic adaptations				
6	Unit 6: Phylum Annelida		3	DEBARSHI	
	General characters and classification	up to		MONDAL	
	classes; Metamerism in Annelida				
7	Unit 7: Phylum Arthropoda		4	DEBARSHI	
	General characters and classification u			MONDAL	
	classes; Vision in Arthropoda, Metam	orphosis			
	in Insects				
	W. 1.0 DI 1. 75 W		0		
8	Unit 8: Phylum Mollusca	n un to	3	Dr. MANIDIP	
	General characters and classificatio classes; Torsion in gastropod	•		SHASMAL	
		J			
9	Unit 9: Phylum Echinodermata		3	Dr. MANIDIP	
	General characters and classificatio	•		SHASMAL	
	classes; Water-vascular system in As	sieroidea			
10	Unit 10: Protochordates	C	3	Dr. MANIDIP	
	General features and Phylogeny	ot ot		SHASMAL	
	Protochordata				
11	Unit 11: Agnatha		3	Dr. MANIDIP	
L					1

	General features of Agnatha and classification of cyclostomes up to classes		SHASMAL
12	Unit 12: Pisces General features and Classification up to orders; Osmoregulation in Fishes	3	Dr. SUDIPTA CHAKRABORTY
13	Unit 13: Amphibia General features and Classification up to orders; Parental care	3	Dr. SUDIPTA CHAKRABORTY
14	Unit 14: Reptiles General features and Classification up to orders; Poisonous and non-poisonous snakes, Biting mechanism in snakes	3	Dr. SUDIPTA CHAKRABORTY
15	Unit 15: Aves General features and Classification up to orders; Flight adaptations in birds	3	Dr. SUDIPTA CHAKRABORTY
16	Unit 17: Mammals Classification up to orders; Origin of mammals	3	Dr. SUDIPTA CHAKRABORTY

Seme	ster I (AY 2023-2024)	Period:	Feb,202	3 to July,2023	
-	: DSC1AP (Animal diversity)	Full Ma	rks: 20	Credit:2	
(Prac			1	1	1
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of the following specimens: Amoeba, Euglena, Plasmodium, Param Sycon, Hyalonema, and Euplectella, Ob Physalia, Aurelia, Tubipora, Metridium, solium, Male and female Ascaris lumbr Aphrodite, Nereis, Pheretima, Hirudina Palaemon, Cancer, Limulus, Palamnaeu Scolopendra, Julus, Periplaneta, Apis, Co Dentalium, Pila, Unio, Loligo, Sepia, Oc Pentaceros, Ophiura, Echinus, Cucumal Antedon, Balanoglossus, Herdmania, Branchiostoma, Petromyzon, Sphyrna, Torpedo, Labeo, Exocoetus, Anguilla, Ichthyophis/Ureotyphlus, Salamandra, Hyla, Chelone, Hemidactylus, Chamaela Draco, Vipera, Naja, Crocodylus, Gavia, six common birds from different orders.	elia, Taenia icoides, ria, s, chiton, topus, ria and Pristis, Bufo, eon, lis, Any	10	DEBARSHI MONDAL	
2	Study of the following permanent so 1. T.S. and L.S. of Sycon, Study of life history stages of Tacasta. T.S. of male and female Ascar New for identification of poisonous.	enia, is	3	Dr. MANIDIP SHASMAL	
3	3. Key for identification of poisonous non-poisonous snakes An "animal album" containing photogr cut outs, with appropriate write up above mentioned taxa. Different taxa/may be given to different sets of stude this purpose.	aphs, out the topics	3	Dr. SUDIPTA CHAKRABORTY	

Curriculum Plan Semester II

Semester II (AY 2023-2024) Period:		d: Feb,2023 to July,2023			
Paper	Paper: DSC-1B (Comparative Anatomy and Full Ma		rks: 55	Credit: 4	
	Development Biology of Vertebrates)				
(Theo	ry) TOPICS		CLASSES	Class taken by	Dle
SI. No.	TOPICS		ALLOTED	Class taken by	Remark
1	Unit 1: Integumentary System		4	Dr. MANIDIP	
	Derivatives of integument w.r.t. glands	and		SHASMAL	
	digital tips				
2	Unit 2: Skeletal System		4	Dr. MANIDIP	
_	·		-	SHASMAL	
	Evolution of visceral arches			SUASMAL	
3	Unit 3: Digestive System		4	Dr. MANIDIP	
3	Brief account of alimentary canal and		4		
	digestive glands			SHASMAL	
	4.600.110 8.41.40				
4	Unit 4: Respiratory System		4	Dr. MANIDIP	
	Brief account of gills, lungs, air sacs and	d swim		SHASMAL	
	bladder				
5	Unit 5: Circulatory System		5	DEBARSHI	
	Evalution of boost and partic arches			MONDAL	
	Evolution of heart and aortic arches				
6	Unit 6: Urinogenital System		5	DEBARSHI	
	Succession of kidney, Evolution of urin	ogenital		MONDAL	
	ducts				
7	Unit 7: Nervous System		5	DEBARSHI	
	Comparative account of brain		_	MONDAL	
				MONDAL	
	W ** 0 C		4	DED A DOVE	
8	Unit 8: Sense Organs		4	DEBARSHI	
	Receptors and its types.			MONDAL	
9	Unit 9: Early Embryonic Developme	nt	5	Dr. SUDIPTA	
	Gametogenesis: Spermatogenesis and			CHAKRABORTY	
	oogenesis w.r.t. mammals, vitellogene				
	birds; Fertilization: external (amphibia				
	internal (mammals), blocks to polysper	-			
	Early development of frog and humans				
	(structure of mature egg and its memb patterns of cleavage, fate map, up to	ranes,			
	patterns of cleavage, rate map, up to				

	formation of gastrula);types of morphogenetic movements; Fate of germ layers; Neurulation in frog embryo.			
10	Unit 10: Late Embryonic Development Implantation of embryo in humans, Formation of human placenta and functions, other types of placenta on the basis of histology; Metamorphic events in frog life cycle and its hormonal regulation.	5	Dr. SUDIPTA CHAKRABORTY	
11	Unit 11: Control of Development Fundamental processes in development (brief idea) – Gene activation, determination, induction, Differentiation, morphogenesis, intercellular communication, cell movements and cell death	5	Dr. SUDIPTA CHAKRABORTY	

Semes	ster II (AY 2023-2024)	Period	: Feb,202	23 to July,2023	
Devel	: DSC1BP (Comparative Anatomy and opmental Biology of Vertebrates ctical)	Full Ma	arks: 20	Credit: 2	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Osteology: a) Disarticulated skelet fowl and rabbit b) Carapace and plastron of turtle /tortoc) Mammalian skulls: One herbivoro one carnivorous animal.	oise	3	Dr. SUDIPTA CHAKRABORTY	
2	2. Frog - Study of developmental st whole mounts and sections the permanent slides – cleavage stages, ble gastrula neurula, tail bud stage, the external and internal gill stages.	hrough lastula,	4	Dr. SUDIPTA CHAKRABORTY	
3	3. Study of the different types of plantistological sections through perroller slides or photomicrographs.		3	DEBARSHI MONDAL	
4	4. Study of placental development in h by ultrasound scans.	umans	3	Dr. MANIDIP SHASMAL	
5	5. Examination of gametes - frog/rat - s and ova through permanent slides or photomicrographs	sperm	3	Dr. MANIDIP SHASMAL	

Curriculum Plan Semester III

Semester III (AY 2023-2024) Period: Feb			to July,2023		
_	Paper: DSC1CT (Physiology and Full Marks:		55	Credit: 4	
	emistry) (Theory)		CI ACCEC	C1	l n 1
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Nerve and muscle		5	DEBARSHI	
	Structure of a neuron, Resting mem	brane		MONDAL	
	potential, Graded potential, Origin o	of Action		MONDINE	
	potential and its propagation in mye	elinated and			
	non-myelinated nerve fibres, Ultra-s				
	skeletal muscle, Molecular and cher	nical basis			
	of muscle contractio				
2	Unit 2: Digestion		5	DEBARSHI	
	Physiology of digestion in the alime	ntary canal;		MONDAL	
	Absorption of carbohydrates, protei	ns, lipids		MONDAL	
3	Unit 3. Dogniyation		5	DEDARGII	
3	Unit 3: Respiration Pulmonary ventilation, Respiratory	volumes	3	DEBARSHI	
	and capacities, Transport of oxygen			MONDAL	
	dioxide in blood.	and carbon			
	dioxide in sidod.				
4	Unit 4: Excretion		5	Dr. SUDIPTA	
	Structure of nephron, Mechanism o	f Urine		CHAKRABORTY	
	formation, Counter-current Mechar	nism			
5	Unit 5: Cardiovascular system		5	Dr. SUDIPTA	
	Composition of blood, Hemostasis, S	Structure of	3		
	Heart, Origin and conduction of the			CHAKRABORTY	
	impulse,Cardiac cycle				
6	Unit 6: Reproduction and Endocri		5	Dr. SUDIPTA	
	Physiology of male reproduction: Ho			CHAKRABORTY	
	control of spermatogenesis; Physiol				
	female reproduction: hormonal con				
	menstrual cycle Structure and funct				
	pituitary, thyroid, parathyroid, pand	reas and			
	adrenal				
7	Unit 7: Carbohydrate Metabolism		5	Dr. MANIDIP	
	Glycolysis, Krebs Cycle, Pentose pho	sphate		SHASMAL	
	pathway, Gluconeogenesis, Glycoge				
	metabolism, Review of electron tran	nsport chain			
8	Unit 8: Lipid Metabolism		5	Dr. MANIDIP	
	Biosynthesis and β oxidation of palm	nitic acid		SHASMAL	
	,			SUASMAL	
9	Unit 9: Protein metabolism		5	Dr. MANIDIP	
	Transamination, Deamination and L	Irea cycle		SHASMAL	

10	Unit 10: Enzymes Introduction, Mechanism of action, Enzyme kinetics, inhibition and regulation	5	DEBARSHI MONDAL	

Semes	Semester III (AY 2023-2024) Period: Feb, 2023 to July, 2023				
	: DSC1CP (Physiology and emistry) (Practical)	Full Marks: 20	Credit: 2		
Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark	
1	Preparation of hemin as hemochromogen crystals.	nd 2	Dr. SUDIPTA CHAKRABORTY		
2	2. Study of permanent histologic sections of mammalian pituitar thyroid, pancreas, adrenal gland.		DEBARSHI MONDAL		
3	3. Study of permanent slides of spin cord, duodenum, liver, lung, kidne bone, cartilage.		DEBARSHI MONDAL		
4	4. Qualitative tests to identify function groups of carbohydrates in give solutions (Glucose, Fructose, Sucros Lactose).	en	Dr. MANIDIP SHASMAL		
5	5. Estimation of total protein in give solutions by Lowry's method.	en 2	Dr. MANIDIP SHASMAL		
6	6. Study of activity of salivary amyla under optimum condition	se 2	Dr. SUDIPTA CHAKRABORTY		

Semes	ster III (AY 2023-2024)	Period: F	eb,2023	to July,2023	
Paper	: SEC1T (Apiculture) (Theory)	Full Mark	s: 55	Credit: 4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Biology of Bees History, Classification and Biology of Bees. Social Organization of Bee Colo	•	10	Dr. SUDIPTA CHAKRABORTY	
2	Unit 2: Rearing of Bees Artificial Bee rearing (Apiary), Beehiv Newton and Langstroth. Bee Pastura, Selection of Bee Species for Apicultur Keeping Equipment. Methods of Extr Honey (Indigenous and Modern)	ge. ·e. Bee	10	Dr. SUDIPTA CHAKRABORTY	
3	Unit 3: Diseases and Enemies Bee Diseases and Enemies. Control at Preventive measures.	nd	10	DEBARSHI MONDAL	

4	Unit 4: Bee Economy Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc	10	DEBARSHI MONDAL
5	Unit 5: Entrepreneurship in Apiculture Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial. Beehives for cross pollination in horticultural gardens	10	Dr. MANIDIP SHASMAL

Curriculum Plan Semester IV

Semes	ster IV (AY 2023-2024) (Z0010gy H		eb,2023	to July,2023	
Paper		ull Marks		Credit: 4	
Evolu	tionary Biology) (Theory)				
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to Genetics Mendel's work on transmission of traits Genetic Variation, Molecular basis of genetic variation	-	4	DEBARSHI MONDAL	
2	Unit 2: Mendelian Genetics a Extension Principles of Inheritance, Chromosome of inheritance, Incomplete dominance a codominance, Multiple alleles, Lethal a Epistasis, Pleiotropy, sex linked inherita extra-chromosomal inheritance	and Ileles,	4	DEBARSHI MONDAL	
3	Unit 3: Linkage, Crossing Over Chromosomal Mapping Linkage and crossing over, Recombinate frequency as a measure of linkage intertwo factor and three factor crosses, Interference and coincidence, Somatic genetics – an alternative approach to genepoing	ion nsity, cell	5	DEBARSHI MONDAL	
4	Unit 4: Mutations Chromosomal Mutations: Deletion; Duplication; Inversion; Translocation; Aneuploidy and Polyploidy; Gene muta Induced versus Spontaneous mutations versus Suppressor mutations,		4	DEBARSHI MONDAL	
5	Unit 5: Sex Determination Chromosomal mechanisms, dosage compensation		4	DEBARSHI MONDAL	
6	Unit 6: History of Life Major Events in History of Life		4	Dr. SUDIPTA CHAKRABORTY	
7	Unit 7: Introduction to Evolu Theories	tionary	4	Dr. SUDIPTA	

	Lamarckism, Darwinism, Neo-Darwinism		CHAKRABORTY
8	Unit 8: Direct Evidences of Evolution Types of fossils, Incompleteness of fossil record, Dating of fossils, Phylogeny of horse	4	Dr. SUDIPTA CHAKRABORTY
9	Unit 9: Processes of Evolutionary Change Organic variations; Isolating Mechanisms; Natural selection (Example: Industrial melanism); Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection	4	Dr. SUDIPTA CHAKRABORTY
10	Unit 10: Species Concept Biological species concept (Advantages and Limitations); Modes of speciation (Allopatric, Sympatric)	5	Dr. MANIDIP SHASMAL
11	Unit 11: Macro-evolution Macro-evolutionary Principles (example: Darwin's Finches)	4	Dr. MANIDIP SHASMAL
12	Unit 12: Extinction Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution	4	Dr. MANIDIP SHASMAL

Semester IV (AY 2023-2024)		Period: Feb,2023 to July,2023			}
Paper: DSC1DP (Genetics and Evolutionary Biology) (Practical)		Full N	Aarks: 20	Credit: 2	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	1. Study of Mendelian inheritance and interactions (Non- Mendelian inherit using suitable examples. Verify the reusing Chi-square test.	ance)	3	Dr. SUDIPTA CHAKRABORTY	
2	2. Study of Linkage, recombination, mapping using the data.	gene	2	Dr. SUDIPTA CHAKRABORTY	
3	3. Study of Human Karyotypes (norma abnormal).	l and	3	DEBARSHI MONDAL	
4	4. Study of fossil evidences from plaste models and pictures	r cast	2	DEBARSHI MONDAL	
5	5. Study of homology and analogy suitable specimens/ pictures	from	2	DEBARSHI MONDAL	
6	6. Charts: a. Phylogeny of horse diagrams/ cut outs of limbs and tee horse ancestors b. Darwin's Finches with diagrams/ cut	th of	3	Dr. MANIDIP SHASMAL	

	of beaks of different species			
7	7. Visit to Natural History Museum and submission of report	1	Dr. MANIDIP SHASMAL	

Curriculum Plan Semester V

Semester V (AY 2023-2024) Period			: Feb,2023 to July,2023		
Paper	: DSE1T (Aquatic biology) (Theory)	Full Ma		Credit: 4	
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	UNIT 1: Aquatic Biomes Brief introduction of the aquatic biomes Freshwater ecosystem (lakes, wetlands, streams and rivers), estuaries, intertidal zones, oceanic pelagic zone, marine ber zone and coral reefs.		12	DEBARSHI MONDAL	
2	UNIT 2: Freshwater Biology Lakes: Origin and classification, Lake Ecosystem, Lake morphometry, Ph chemical Characteristics: Light, Temper Thermal stratification, Dissolved Carbonate, Bicarbonates, Phosphates Nitrates, Turbidity; Dissolved gases (o carbon dioxide). Nutrient Cycles in Nitrogen, Sulphur and Phosphorous. Streams: Different stages of stream development, Physico-chemical environ Adaptation of hill-stream fishes.	ysico- erature, Solids, s and xygen, Lakes-	13	DEBARSHI MONDAL	
3	UNIT 3: Marine Biology Salinity and density of Sea water, Continus shelf, Adaptations of deep sea organism Coral reefs, Sea weeds.		12	Dr. SUDIPTA CHAKRABORTY	
4	UNIT 4: Management of Aquatic Reso Causes of pollution: Agricultural, Indust Sewage, Thermal and Oil spills, Eutrophication, Management and conservation (legislations), Sewage trea Water quality assessment- BOD and CO	rial, tment	13	Dr. MANIDIP SHASMAL	

Semester V (AY 2023-2024)		Per	iod: Feb,2	2023 to July,2023	3
Paper: DSE1P (Aquatic Biology) (Practical)		Full	Marks: 20	0 Credit: 2	
Sl. No.	Sl. No. TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Determine the area of a lake using graphimetric and gravimetric method.		3	DEBARSHI MONDAL	

2	2. Identify the important macrophytes, phytoplanktons and zooplanktons present in a lake ecosystem.	4	DEBARSHI MONDAL
3	3. Determine the amount of Turbidity/transparency, Dissolved oxygen, carbon dioxide, alkalinity (carbonates & bicarbonates) in water collected from a nearby lake/water body.	5	Dr. MANIDIP SHASMAL
4	4. Instruments used in limnology (Secchi disc, Van Dorn Bottle, Conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.	3	Dr. SUDIPTA CHAKRABORTY
5	5. A Project Report on a visit to a Sewage treatment plant/Marine bioreserve/ Fisheries Institutes	1	Dr. SUDIPTA CHAKRABORTY

Semester V (AY 2023-2024)		Per	riod: Feb,2023	3 to July,2023	
Paper: SEC3T (Medical Diagnostics)		Ful	l Marks: 55	Credit: 4	
(Theo					
Sl. No.	TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction to Medical		8	Dr. MANIDIP	
	Diagnostics and its Importance			SHASMAL	
2	Unit 2: Diagnostics Methods Used Analysis of Blood Blood composition, Preparation of blo smear and Differential Count (D.C) usi Leishman's stain, Platelet count using haemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)	od	10	Dr. SUDIPTA CHAKRABORTY	
3	Unit 3: Diagnostic Methods Used Urine Analysis Urine Analysis: Physical characteristics Abnormal constituents		8	Dr. SUDIPTA CHAKRABORTY	
4	Unit 4:Non-infectious Diseases Causes, types, symptoms, complicatio diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit	ns,	8	Dr. MANIDIP SHASMAL	
5	Unit 5: Infectious Diseases Causes, types, symptoms, diagnosis ar prevention of Tuberculosis and Hepati		8	Dr. MANIDIP SHASMAL	
5	Unit 6: Tumours Types (Benign/Malignant), Detection a metastasis; Medical imaging: X-Ray o Bone fracture, PET, MRI and CT Scan (using photographs).	f	8	DEBARSHI MONDAL	

Curriculum Plan Semester VI

(Zoology GENERAL; CBCS)

Seme	ster VI (AY 2023-2024)		Feb,202	23 to July,2023	3
•	: DSE2T (Animal Biotechnology	Full Ma	arks: 55	Credit: 4	
) (The	eory) TOPICS		CLASSES ALLOTED	Class taken by	Remark
1	Unit 1: Introduction Concept and scope of biotechnology		8	Dr. MANIDIP SHASMAL	
2	Unit 2: Molecular Techniques in Genemanipulation Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M1 BAC, YAC, MAC and Expression vectors (characteristics) Restriction enzymes: nomenclature, detailed study of Type II Transformation techniques: Calcium chimethod and electroporation. Construct genomic and cDNA libraries and screenicolony and plaque hybridization Souther Northern and Western blotting; DNA sequencing: Sanger method; Polymeras Chain Reaction, DNA Finger Printing and micro array	loride ion of ing by ern, e d DNA	16	Dr. SUDIPTA CHAKRABORTY	
3	Unit 3: Genetically Modified Orgal Production of cloned and transgenic an Nuclear Transplantation, Retroviral Met DNA microinjection, Applications of transgenic animals: Production of pharmaceuticals, production of donor of knockout mice. Production of transgeniplants: Agrobacterium mediated transformation. Applications of transgeniplants: insect and herbicide resistant plants:	imals: thod, organs, c	16	Dr. MANIDIP SHASMAL	
4	Unit 4: Culture Techniques Applications Animal cell culture, Expressing cloned g in mammalian cells, Molecular diagnosi genetic diseases (Cystic fibrosis, Sickle canemia); Recombinant DNA in medicine Recombinant insulin and human growth hormone, Gene therapy	enes s of ell es:	10	DEBARSHI MONDAL	

Semester VI (AY 2023-2024)	Period: Feb,2023	to July,2023
Paper: DSE2P (Animal Biotechnology	Full Marks: 20	Credit: 2

) (Pra	ctical)			
Sl. No.	TOPICS	CLASSES ALLOTED	Class taken by	Remark
1	1. Genomic DNA isolation from <i>E. coli</i>	2	DEBARSHI MONDAL	
2	2. Plasmid DNA isolation (pUC 18/19) from Ecoli	2. 2	Dr. SUDIPTA CHAKRABORTY	
3	3. Restriction digestion of plasmid DNA.	2	Dr. SUDIPTA CHAKRABORTY	
4	4. Construction of circular and linear restriction map from the data provided.	on 3	Dr. SUDIPTA CHAKRABORTY	
5	5. Calculation of transformation efficiency fro the data provided.	m 2	Dr. MANIDIP SHASMAL	
6	6. To study following techniques throughhotographs a. Southern Blotting b. Northern Blotting c. Western Blotting d. DNA Sequencing (Sanger's Method) e. PCR f. DNA fingerprinting 7. Project report on animal cell culture	gh 5	Dr. MANIDIP SHASMAL	