5th SEMESTER HONOURS (CORE COURSE & DSE)

SESSION: July 2022 to December 2022

COURSE CODE: BOTACOR11T, BOTACOR12T, BOTADSE01T,

BOTADSE03T

SEM V: CORE COURSE XI

REPRODUCTIVE BIOLOGY OF ANGIOSPERMS

CODE: BOTACOR11T (4 Credits)

COURSE OUTCOME: Angiosperms reproduce sexually by means of flowers. After fertilization, ovaries within flowers develop into fruits that surround, protect, and help disperse the seeds. **Angiosperms** are also known as flower plants because that is their reproductive organ, which mature to seed-containing fruit. The fruit covering on the seed gives **angiosperms** an **advantage** over gymnosperms because they have better protection. The fruit of **angiosperms** are adapted to facilitate seed dispersal.

On completion of this course, the students will be able to:

- Recall the history of reproductive biology of angiosperms & recognize the importance of genetic and molecular aspects of flower development
- 2. Understand structure and functions of anther wall and pollen wall
- 3. Evaluate the special structures of Ovule
- 4. Solve Self-incompatibility in Pollination and fertilization & relate between Embryo,

Endosperm and Seed

5. Comprehend the causes of Polyembryony and apomixes with its classification

THEORY

(BOTACOR11T)

			В	ASIR	RHAT C	OLLEGE L	ESSON	PLAN	FOR CB	CS (FOR	HONS)					
NAME	OF THE	DEPA	RTMENT								ВОТА	NY				
HOD			DR. ARU	NEEN	√A BAI	RDHAN										
INITIAL	S OF FA	CULT	IES		AC	AB	SDG	S	5	ABJ						
PERIOD	OF SEI	MEST	ER	FRO	DM JUI	Y 2022 T	O DEC	EMBER	2022	ı	HON	<u> </u>	ľ	GENE	RAL	
											⊣ √					
SEM	5		Core C	ours	e	11		_	EDIT	4	Cou		ВС	OTACC	R11T	-
Name o	of the C	ourse)		Rep	roductive	Biolog	gy of A	ngiosper	ms						
Course	Co-ord	inato	r		DR.	AYANA C	HAKRA	\ROBT\	,							
TOTAL	MARKS	50			TH		√		TUT				PRA	C		
TOTAL	TOTAL HOURS 60 hrs										l .		I			
					<u>.</u>		_									
			OUP/ MO		E/ TOP	IC	1									
			/MODULE				- ,	oducti			1					
TOTAL			(Adjused t	o 3	THE	ORY	√		TUTORI	AL		P	RAC			
HOURS	<u> </u>	nrs)														
	ı		DISTRIBU	TION			AN (MO	ODULE,	/ UNIT/	SECTIO	N/ TOPIC		•			
SL					T	OPIC					HR	TEA	CHER	ſ	MONTH	1
1	Introd	uctio	n, History	Repr	oducti	ve Biology	of An	giospe	rms		1		AC		AUG	
2						f Angiosp	perms				1 AC		AC		AUG	
3**	Molec	ular a	spects of	Rep	roduct	ive Biolog	y of Ar	ngiospe	rms		1		AC		AUG	
4**																
				TO	TAL HO	DURS					3 Hours	;				

^{**} Alloted total 4 hours adjusted to 3 hours.

UNIT/	SECTION/ GR	OUP/ MODULE/ TO	OPIC	2					
NAME	OF THE UNIT	/MODULE		Repr	oduc	tive developr	nent		
TOTAL	HOURS	6 hrs	THEORY	1		TUTORIAL		PRAC	
	[DISTRIBUTION OF I	ESSON PLAN	(MOD	ULE	/ UNIT/ SECTION	ON/ TOPIC	WISE)	
SL			TOPIC				HR	TEACHER	MONTH
1	Induction o	of flowering					1	ABJ	AUG
2	Flower as a	modified determin	nate shoot				1	ABJ	AUG
3	Flower dev	elopment, morpho	logical aspect	s of Flo	ower	development	1	ABJ	SEPT
4	Genetic asp	ects of Flower dev	elopment				1	ABJ	SEPT
5	Molecular a	aspects of Flower d	evelopment				1	ABJ	SEPT
6	6 QA Discussion						1	ABJ	SEPT
	•					TOTAL HOUR	S 6 Hour	's	

UNIT/	SECTION/ G	ROUP/ MODUL	E/ TOPIC	3					
NAME	OF THE UN	T/MODULE		Anther a	and pollen	biolog	gy		
TOTAL	HOURS	10 hrs	THEORY	√	TUTORIA	٩L		PRAC	
		DISTRIBUTION	OF LESSON PLA	N (MODU	JLE/ UNIT/	SECTI	ON/ TO	PIC WISE)	
SL			TOPIC				HR	TEACHER	MONTH
1	Anther wa	II: Structure and	functions				1	AC	AUG
2	Microspor	ogenesis					1	AC	AUG
3	Callose de	position and its	significance				1	AC	AUG
4	Microgam	etogenesis					1	AC	AUG
5	Pollen wal	l structure					1	AC	AUG
6	MGU (mal	e germ unit) stru	ıcture				1	AC	AUG
7	NPC syster	m					1	AC	SEPT
8	Palynology	and scope					1	AC	SEPT
9	Pollen wal	l proteins, poller	n viability				1	AC	SEPT
10	QA discuss	sion			•		1	AC	SEPT
		·			TOTAL HO	OURS	10 Hot	ırs	

UNIT/ S	SECTION	/ GROUP/ N	IODULE/ TOPIC	4					
NAME	OF THE U	JNIT/MODU	LE	Ovule					
TOTAL		10 hrs	THEORY	1	TUTOR	IAL	F	PRAC	
HOURS	;								
		DISTRIBU	TION OF LESSON	PLAN (N	10DULE/	UNIT/ SEC	TION/ TO	PIC WISE)	
SL			TOPIC				HR	TEACHER	MONTH
1	Introdu	iction to ovu	le and it's structu	ıre			1	AC	SEPT
2	Types	of ovule					1	AC	SEPT
3	Structu	ire of female	gametophyte				1	AC	SEPT
4	Megas	porogenesis	(Details of Mono	sporic ar	nd Bispori	c type)	1	AC	OCT
5	Megas	porogenesis	(Tetrasporic type	<u>:)</u>			1	AC	OCT
6	Megag	ametogenes	is (details of <i>Poly</i>	gonum type)			1	AC	ОСТ
7	Organia	zation of ma	ture embryo sac				1	AC	NOV

8	QA discussion	1	AC	NOV
9	QA discussion	1	AC	NOV
10	Class Test	1	AC	NOV
	TOTAL HOURS	10 Hou	rs	

UNIT/	SECTION/	GROUP/ MOD	ULE/ TOPIC	5						
NAME	OF THE U	NIT/MODULE		Pollinat	ion and f	ertiliza	tion			
TOTAL	HOURS	6 hrs	THEORY	√	TUTORI	AL			PRAC	
	D	ISTRIBUTION (OF LESSON PLA	N (MOD	ULE/ UNI	T/ SEC	TION/	TOPIC	C WISE)	•
SL			TOPIC				HR	TEA	CHER	MONTH
1	Pollinati	on: types(in b	rief) and signif	ficance			1		ABJ	SEPT
2	Pollination	on: characteris	tics of each typ	oe (Anem	ophily,		1		ABJ	NOV
	Hydroph	ily, Zoophily)w	ith examples.							
3	Pollination	on: characteris	tics of each typ	oe			1		ABJ	NOV
	(Malacor	ohily,Ornithop	nily)with exam	ples.						
4	Adaptati	ions of pollina	tion mechanis	sm			1		ABJ	NOV
5 Structure of style and stigma							1		ABJ	DEC
6	6 Path of pollen tube in pistil, Doubl				on					
	•			٦	TOTAL HO	OURS	6 Hou	rs		•

UNIT/	SECTION/	GROUP/ MO	DULE/ TOPIC	6					
NAME	OF THE U	NIT/MODULE		Self i	ncompatib	ility		,	•
TOTAL	HOURS	10 hrs	THEORY	1	TUTORI	AL		PRAC	
	D	 ISTRIBUTION	OF LESSON PL	AN (MO	DDULF/ UN	IT/ SEC	TION/	TOPIC WISE)	
SL			TOPIC	(, , , , , , , , , , , , , , , , , , ,		HR	TEACHER	MONTH
1	Basic co	ncepts of Sel	- incompatibil	ity			1	AC	NOV
2	Interspe	ecific, Intrasp	ecific, Homom	orphic	,		1	AC	NOV
	Heteror	morphic self-i	ncompatibility	•					
3	GSI and	l SSI					1	AC	NOV
4	Method	ds to overcom	e self-incomp	oatibility			1	AC	NOV
5	Mixed p	oollination					1	AC	NOV
6	Bud pol	llination & Stu	ıb pollination				1	AC	NOV
7	Intra-ov	arian and <i>in</i> v	vitro pollinatio	n			1	AC	NOV
8	Parasex	cual hybridiza	tion				1 AC		NOV
9	Cybrids	and <i>in vitro</i> f	ertilization.				1	AC	DEC
10	Class te	st					1	AC	DEC
		TO	TAL HOURS				10 HR	S	

UNIT/	SECTION	/ GROUP/ MODUL	E/ TOPIC	7					
NAME	OF THE	UNIT/MODULE		Embry	o, Endospei	rm and s	Seed		
TOTAL		10 hrs	THEORY	1	TUTORI	AL		PRAC	
HOURS	S								
		DISTRIBUTIO	N OF LESSON PL	AN (MO	DULE/ UNIT,	/ SECTIO	N/ TO	PIC WISE)	
SL			TOPIC				HR	TEACHER	MONTH
1	Structu	ire and types of Em	bryo and Endos	perm			1	AC	DEC
2	Structu	ire and types of see	ed				1	AC	DEC
3	Genera	al pattern of develo	pment of Dicot	embryo	and endospe	erm	1	AC	DEC
4	Genera	al pattern of developerm	pment of mono	ocot emb	oryo and		1	AC	DEC
5	Suspen	sor - structure and	functions				1	AC	DEC
6	Embryo	o-endosperm relati	onship, Nutritio	n of emb	ryo		1	AC	DEC
7	Unusua	al features; embryo	development i	n <i>Capsell</i>	a bursa-		1	AC	DEC
	pastori	sseed structure							
8	Import	ance of Embryo an	d Endosperm				1	AC	DEC
9	Seed d	ispersal mechanisn	ns.				1	AC	DEC
10	QA disc	cussion					1	AC	DEC
		TC	TAL HOURS				10 H	ours	_

UNIT/	UNIT/ SECTION/ GROUP/ MODULE/ TOPIC NAME OF THE UNIT/MODULE		8						
NAME	OF THE UNI	T/MODULE		Polyem	bryony ar	id apon	nixis		·
TOTAL	HOURS	4 hrs	THEORY	1	TUTORI	AL		PRAC	
	DISTRIBUTION OF LESSON PLA			AN (MODU	JLE/ UNIT,	/ SECTION	ON/ TOP	PIC WISE)	
SL			TOPIC				HR	TEACHER	MONTH
1	Introduction	on to Polyemb	oryony and apomix	(is			1	ABJ	DEC
2	Classificati	on and cause:	s of Polyembryony	1			1	ABJ	DEC
3	Classificati	on and cause:	s of apomixis				1	ABJ	DEC
4	4 Applications of Polyembryony and apomiz						1	AC	DEC
	TOTAL HOURS						4 Hour	s	

PRACTICAL

Core Course XI

Reproductive Biology of Angiosperms (BOTACOR11P)

(CREDIT: 2)

	BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR HONS)															
NAM	E OF THE DE	PARTMENT									ВО	ΓΑΝΥ				
HOD		DR. ARUNE	EMA	BAF	RDHA	N										
INITI	ALS OF FAC	JLTIES	AC		AB	SI	DG	SS		ABJ						
PERIO	DD OF	FROM	JULY	202	2 TO	DEC	CEMB	BER 2	2022		HONS			GENE	RAL	
SEME	STER										٧					
CENA	5	Core Cou	rse	11				CR	EDIT	2	Cours	ie		DOT	A C O D	11D
SEM	3			11				PC	INT	2	Code	9		воп	ACOR	111
Name	e of the Cou	rse	R	epro	oducti	ive E	Biolog	gy of	Angios	perms		•				
Course Co-ordinator DR. AYANA CHAKRABORTY																
TOTA	TOTAL MARKS 25 TH						TUT					PRAC 1		٧		
TOTA	L HOURS	60	Т	Н					TUT				PR	AC	٧	
UNIT	/ SECTION/	GROUP/ MC	DULE	E/ TO	OPIC		PRAG	CTIC	AL							
NAM	E OF THE UI	NIT/MODULE	Ξ				Repr	odu	ctive Bi	ology o	f Angios	oerm	s Pra	actical		
TOTA	L HOURS	60 HRS	Ti	HEO	RY			T	UTORI	AL		PF	RAC	١	/	
		58 HRS														
		DISTRIBUT	ON C)F LE	SSON	I PL	AN (I	MOE	OULE/ U	JNIT/ SE	CTION/	TOPI	C W	ISE)		
SL					TOP	IC						HF	3	TEACH	IER	MONTH
Unit 1																
1.	Anther: Stu	ıdy of Tapetı	ım (aı	moe	boid	and	d glandular) through				2	2	AC	;	AUG	
	slides/micr	ographs/ pho	otogra	aphs	s/ ppt	•										
2.	2. Anther: Study of spore tetrads, uninucleate, bicelled and dehisced anther 2 AC AUG															

	stages through slides/micrographs photographs / photographs/ ppt.			
3.	Anther: Study of male germ unit (MGU) through photographs and schematic representation.	2	AC	AUG
	Unit 2: Pollen grains			
4.	Fresh and acetolyzed pollen showing ornamentation.	2	AC	AUG
5.	Fresh and acetolyzed pollen showing	2	AC	AUG
6.	Fresh and acetolyzed showing monads, dyads, polyads, pollinia (slides/photographs and fresh material)	2	AC	SEPT
7.	Fresh pollen showing polyads and pollinia			SEPT
8.	Ultrastructure of pollen wall (micrograph)	2	AC	SEPT
9.	Pollen viability: Tetrazolium test germination	2	AC	SEPT
10.	Pollen viability: Tetrazolium test germinationrepeat practical			SEPT
11.	Calculation of percentage germination in different media using hanging drop method	2	AC	SEPT
12.	Calculation of percentage germination in different media using hanging drop methodrepeat practical	2	AC	SEPT
	Unit 3: Ovule			
13.	Study of ovule Types- anatropous, orthotropous (permanent slides/specimens/photographs).	2	AC	ОСТ
14.	Study of ovule Types- amphitropous/campylotropous, circinotropous (permanent slides/specimens/photographs).	2	AC	NOV
15.	Study of ovule Types- unitegmic, bitegmic (permanent slides/ specimens/ photographs).	2	AC	NOV
16.	Study of ovule Types- Tenuinucellate and crassinucellate (permanent slides/ specimens/ photographs).	2	AC	NOV
17.	Study of Special structures: Endothelium, obturator, hypostase (permanent slides/specimens/ photographs).	2	AC	NOV
18.	Study of Special structures: caruncle and aril (permanent slides/specimens/photographs).	2	AC	NOV
	Unit 4: Female gametophyte			
19.	Study of Female gametophyte through permanent slides/ photographs: Types.	2	AC	NOV
20.	Study of Female gametophyte through permanent slides/ photographs: Types.	2	AC	NOV
21.	Study of ultrastructure of mature egg apparatus through permanent slides/ photographs.	2	AC	NOV
22.	Unit 5: Endosperms Dissections of developing seeds for endosperm with free-nuclear	2	AC	DEC

	haustoria.			
	Unit:6: Embryogenesis			
23.	Study of dicot embryo through permanent slides/photoghraphs through permanent slide/ photographs;.	2	AC	DEC
24.	Study of embryos at various developmental stages through permanent slide/ photographs	2	AC	DEC
25.	Study of suspensor through electron micrographs/ photographs.	2	AC	DEC
26.	Practice class/ doubt clearing class	2	AC	DEC
27.	Practice class/ doubt clearing class	2	AC	DEC
28.	Practice class/ doubt clearing class	2	AC	DEC
29.	Practice class/ doubt clearing class	2	AC	DEC
30.	Practice class/ doubt clearing class		-	-
	TOTAL	58 HR	S.	

^{***} Total 60 Hours adjusted to 58 hours keeping the syllabus unchanged.

SEM V:CORE COURSE XII

PLANT PHYSIOLOGY

CODE: BOTACOR12T (4 Credits)

COURSE OUTCOME: At the end of this course students will be able to:

- Discuss plant water relations, i.e. how plants acquire, utilize and regulate the flow of water between plant and environment;
- Outline the mineral nutrients plants require, and how they are obtained, metabolized, transported and their role in plants;
- Explain how plant growth regulators regulate the growth and development in plants;
- Describe the physiology of flowering, light responses and seed dormancy in plants

LESSON PLAN FOR SEM V

THEORY

CORE COURSE XII: PLANT PHYSIOLOGY (BOTACOR12T)

*** The allotted total 60 hours for this course has been adjusted to 54 hours, keeping the course content unchanged.

	BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR BOTANY HONS)												
NAME	OF THE	DEPA	RTMENT						ВС	YNATC			
HOD			DR. ARUNE	M	A BARDHAI	V							
INITIA	LS OF FA	ACULTI	ES	AC	AB	SDG	SS	ABJ					
PERIO	D OF		FROM JULY	202	22 TO DEC	EMBER	2022		HONS	S GENERAL			
SEMES	TER								V				
SE	М	5	Core Cours	e	12	CRED	IT POINT	4	Cour	se Cod	e	BOTAC	OR12T
Name	of the C	Course			PLANT PHY	'SIOLOG	SY (CC12)		•				
Course	Co-ord	linator			DR. ARUNE	EMA B	ARDHAN						
TOTAL	MARKS	S	50		TH	٧	TUT			PR	RAC		
TOTAL	HOURS	5	60 Hrs (Adj	uste	ed to 54 hr	s)	•			•		•	
UNIT/	SECTIO	N/ GRO	OUP/ MODUL	.E/	TOPIC	1							
NAME	OF THE	UNIT/	MODULE			Plant-	-water rela	ations					
TOTAL		10 h	nrs (adjusted	7	THEORY	٧	TUTOR	IAL		PRA	С		
HOUR	S	to 9	hrs)										
		D	ISTRIBUTION					NIT/ S	ECTION/		WIS	-	T
SL					URE HEAD	/TOPIC	1			HR		TEACHER	MONTH
1			tial and its co		onents					1		AB	AUG
2			ption by roots	5						1		AB	AUG
3	Aquap									1		AB	AUG
4			vater movem		, symplast,	apopla	st			1		AB	AUG
5			ane pathway	S						1		AB	AUG
6			e, guttation							1		AB	AUG
7			o-cohesion -te							1		AB	AUG
8			n and factors	affe	ecting trans	piratio	n, antitran	spirant	ts	1		AB	AUG
9	QA dis	cussio	n							1		AB	AUG
10**													
					TOTAL					9 Ho	urs		

^{***} Alloted total 10 hours adjusted to 9 hours.

UNIT/	SECTION	GROUP/ MODUI	LE/ TOPIC	2				
NAME	OF THE U	INIT/MODULE		Mine	ral Nutrition		<u>.</u>	
TOTAL	HOURS	8 hrs (adjusted	THEORY	٧	TUTORIAL		PRAC	
		to 7 hrs)						
		DISTRIBUTION	OF LESSON PL	AN (MC	DDULE/ UNIT/ S	SECTION	/ TOPIC WISE)	·
SL		LECTU	RE HEAD/TOP	PIC		HR	TEACHER	MONTH
1	Essentia	ıl and beneficial el	lements, macr	o- and		1	AB	AUG
	micronu	ıtrients						
2	Method	ls of study and use	of nutrient so	olutions	i	1	AB	SEPT
3	Criteria	for essentiality				1	AB	SEPT
4	Mineral	deficiency sympto	oms			1	AB	SEPT
5	Roles of	essential elemen	ts			1	AB	SEPT
6	Chelatin	ng agents				1	AB	SEPT
7	Doubt c	learing class		•		1	AB	SEPT
8**				•				
			TOTAL	•		7 Hours	S	

^{***} Alloted total 8 hours adjusted to 7 hours.

UNIT	/ SECTIOI	N/ GROUP/ MOD	JLE/ TOPIC	3								
NAMI	E OF THE	UNIT/MODULE		Nutri	ent Uptake	<u>'</u>						
TOTA	L	8 hrs (adjusted	THEORY	٧	TUTORIAL		PRAC					
HOUF	RS	to 7 hrs)										
		DISTRIBUTION	OF LESSON I	PLAN (N	ODULE/ UNIT/ SEC	FION/ TOPIC WISE)						
SL		LECTURE HEAD/TOPIC HR TEACHER MONTH										
1	Soil as a	a nutrient reservo	ir, transport o	of ions a	cross cell	1	AB	SEPT				
	membr	ane										
2	Passive	absorption				1	AB	SEPT				
3	Electro	chemical gradient				1	AB	SEPT				
4	Facilita	ted diffusion, activ	e absorption			1	AB	SEPT				
5	Role of	ATP, carrier syste	ms, Proton A	ΓPase ρι	ımp and ion influx	1	AB	SEPT				
6	Uniport	t, co-transport, syı	mport, antipo	rt		1	AB	SEPT				
7	Unit cla	iss test			1	AB	SEPT					
8**				•								
			TOTAL	•		7 Hours						

^{***} Alloted total 8 hours adjusted to 7 hours

UNIT/ S	SECTION/ GRO	OUP/ MODULE/ TO	PIC	4				
NAME	OF THE UNIT/	MODULE		Translo	ocation in the p	hloem		
TOTAL	HOURS	8 hrs (adjusted to 6 hrs)	THEORY	٧	TUTORIAL	PRA	С	
	D	ISTRIBUTION OF LE	SSON PLAN (I	MODULE	/ UNIT/ SECTION	I/ TOPIC V	WISE)	
SL		LECTU	RE HEAD/TO	PIC		HR	TEACHER	MONTH
1	Experimenta	al evidence in suppo	ort of phloem	as the sit	te of sugar	1	AB	SEPT
	translocatio	n						
2	Pressure flo	w model				1	AB	SEPT
3	Phloem load	ling and unloading				1	AB	SEPT
4	Source -sink	relationship				1	AB	NOV
5	Questions &	answers discussion	n			1	AB	NOV
6	Class Test					1	AB	NOV
7**								
8**								
			TOTAL			6 Ho	urs	

^{***} Alloted total 8 hours adjusted to 6 hours.

UNI	T/ SECTION/ GRO	DUP/ MODULE/ T	OPIC	5							
NAN	IE OF THE UNIT/	MODULE		Plant (Growth Re	gulators	-				
TOT	AL HOURS	14 hrs	THEORY	٧	TUTORI	AL		PRAC			
		DISTRIBUTION OF	LESSON PLAN	(MODU	LE/ UNIT/	SECTION	/ TOPIC	WISE)			
SL		LECT	JRE HEAD/TOP	IC			HR	TEACHER	MONTH		
1	Discovery, che	mical nature (ba	sic structure) o	f auxin			1	AB	NOV		
2	Bioassays of a	uxin, Molecular a	of auxin	1	AB	NOV					
3	Discovery, chemical nature (basic structure) of gibberellins 1 AB NOV										
4	Bioassays of gi gibberellins	ibberellins, Mole	cular aspects o	f the ph	ysiologica	l roles of	1	AB	NOV		
5	Discovery, che	emical nature (ba	sic structure) o	f cytoki	nins		1	AB	NOV		
6	Bioassays of cy	ytokinins, Molecu	llar aspects of t	the phys	siological	roles of	1	AB	NOV		
7	Discovery, che	emical nature (ba	sic structure) o	f abscis	sic acid		1	AB	NOV		
8	Bioassays of a of abscissic aci	abscissic acid, Mo	lecular aspects	of the	ohysiologi	cal roles	1	AB	NOV		
9	Discovery, che	emical nature (ba	sic structure) o	f ethyle	ne		1	AB	NOV		
10	Bioassays of et ethylene	thylene, Molecul	ar aspects of th	ne physi	ological ro	oles of	1	AB	NOV		
11	Brief account of	of Brassinosteroi		1	AB	NOV					
12	Brief account of	of Jasmonic acid					1	AB	DEC		
13	Question Answ	er discussion					1	AB	DEC		
14	Unit class test				•		1	AB	DEC		
	TOTAL 14 Hours										

UNIT/ S	SECTION/	GROUP/ MODULE/ 1	ГОРІС	6				
NAME	OF THE U	NIT/MODULE		Phys	iology of flower	ing	<u>'</u>	
TOTAL	HOURS	6 hrs (adjusted to	THEORY	٧	TUTORIAL		PRAC	
		5 hrs)						
		DISTRIBUTION O	F LESSON PLA	N (MO	DULE/ UNIT/ S	ECTION/	TOPIC WISE)	
SL		LECTUR	E HEAD/TOP	IC		HR	TEACHER	MONTH
1	Photop	eriodism				1	AB	DEC
2	Flower	ing stimulus				1	AB	DEC
3	Florige	n concept, Vernalizat	ion			1	AB	DEC
4	Seed do	ormancy and germin	ation			1	AB	DEC
5	Question Answer discussion					1	AB	DEC
6**	** Unit class test					1	AB	DEC
			TOTAL		·	5 Hour	rs	

^{***} Alloted total 6 hours adjusted to 5 hours

UNIT	/ SECTION/	DULE/ TOPIC	7							
NAN	IE OF THE UN	NIT/MODULE		Phytod	chrome, cy	tochromes	and phot	otro		
TOTA	AL HOURS	6 hrs	THEORY	٧	TUTOR	AL		PRA	C	
		DISTRIBUT	ION OF LESSO	N PLAN (I	MODULE/	JNIT/ SECT	TION/ TO	PIC V	VISE)	
SL			LECTURE HEA	AD/TOPIC	2		H	ΗR	TEACHER	MONTH
1	Discovery, phototrop		ture of phytoch	rome, cy	tochrome	and		1	AB	DEC
2	+ · · · ·	ytochrome, c	ytochrome					1	AB	DEC
3	Role of ph	ototropins in	photomorpho	genesis				1	AB	DEC
4	low energy	y responses (LER) and high i	rradiance	responses	(HIR)		1	AB	DEC
5	Mode of a	ction of phyt	ochrome, cyto	chrome a	nd phototr	opins		1	AB	DEC
6	Question A	Answer discus	ssion					1	AB	DEC
			TOTA	\L			6 H	lours	•	

^{***} The allotted total 60 hours for this course has been adjusted to 54 hours, keeping the course content unchanged.

PRACTICAL

Core Course XII

Plant Physiology

Plant Physiology (BOTACOR12P)

(CREDIT: 2)

				E	BASI	RHAT	COL	LEGE LE	SSON	I PLAN	FOR CB	CS (FOR	HON	IS)			
NAME	OF TH	IE DE	PAR	TMENT								E	ЗОТА	NY			
HOD			DR	. ARUNE	EMA	A BARE	IAHC	١									
INITIAL	S OF	FACU	LTIE	S	AC	А	В	SDG	SS		ABJ						
PERIOD	OF			FROM	JUL	/ 2022	TO	DECEM	IBER 2	2022		HONS	•		GENERAL		
SEMEST	ΓER											v					
SEM	5		Co	re Cour	se	12			CRI	EDIT	2	Cour	se		D.C	OTACOR12P	
JLIVI	,					12			PO	INT	2	Cod	е		ь	TACORIZE	
Name o	of the	Cour	'se		F	Reproc	lucti	ve Biolo	Biology of Angiosperms								
Course	Со-о	rdina	tor]	OR. AY	ANA	CHAKR	KRABORTY								
TOTAL	MAR	KS	25		1	ГН				TUT				PR	AC	٧	
TOTAL	HOU	RS	60			ГН				TUT				PRAC		٧	
UNIT/ S	SECTI	ON/ (GRO	UP/ MO	DUL	E/TO	PIC		PRA	CTICAL							
NAME	HE UN	IIT/N	NODULE					Rep	roducti	ve Biolo	ogy of A	ngios	perm	ns Prac	tical		
TOTAL	HOU	RS	60 l	IRS			THI	ORY		TUT	ORIAL		PF	RAC	١	1	
			(adj	usted to	58	HRS)											
DISTRIBUTION OF LESSON P								ON PLA	N (M	ODULE/	/ UNIT/	SECTIO	N/ TC	OPIC	WISE)		

SL	TOPIC	HR	TEACHER	MONTH
	Hand on practice experiments			
	Unit 1			
1.	Determination of osmotic potential of plant cell sap by plasmolytic method		AB	AUG
	Unit 2			
2.	Determination of water potential of given tissue (potato tuber) by weight method.	2	AB	AUG
	Unit 3			
3.	Study of the effect of wind on the rate of transpiration in <i>Colocasia</i> leaf.	2	AB	AUG
4.	Study of the effect of light on the rate of transpiration in <i>Colocasia</i> leaf.	2	AB	AUG
	Unit 4			
5.	Calculation of stomatal index and stomatal frequency from the two surface of leaves of a mesophyte (<i>Basella</i>)	2	AB	AUG
6.	Calculation of stomatal index and stomatal frequency from the two surface of leaves of xerophytes (<i>Ficus benghalensis</i>).	2	AB	AUG
	Unit 5			
7.	Determination of the proportion of area covered by stomatal pore with respect to the total leaf area for mesophyte (Basella) (both surfaces).	2	AB	AUG
8.	Determination of the proportion of area covered by stomatal pore with respect to the total leaf area for xerophyte (<i>Ficus benghalensis</i>) (both surfaces).	2	AB	SEPT
	Unit:6			
9.	To study the phenomenon of epigeal seed germination with respect to light (castor seeds).		AB	SEPT
10.	To study the phenomenon of hypogeal seed germination with respect to light (gram seeds).		AB	SEPT
11.	To study the phenomenon of hypogeal seed germination with respect to light (corn seeds).	2	AB	SEPT
	Unit:7			
12.	To study the effect of different concentrations of IAA on <i>Avena</i> coleoptile elongation (IAA bioassay).	2	AB	SEPT
13.	To study the effect of different concentrations of IAA on <i>Avena</i> coleoptile elongation (IAA bioassay). (repeat class)	2	AB	SEPT
4 -	Unit:8	-		
14.	To study the induction of amylase activity in germinating wheat grains.	2	AB	SEPT
15.	To study the induction of amylase activity in germinating barley grains.	2	AB	ОСТ
	Demonstration experiments			

	TOTAL	58 HRS		<u>I</u>
30.	Practice class/ doubt clearing class			
29.	Practice class/ doubt clearing class	2	AB	DEC
28.	Practice class/ doubt clearing class	2	AB	DEC
27.	Practice class/ doubt clearing class	2	AB	DEC
26.	Practice class/ doubt clearing class	2	AB	DEC
25.	Practice class/ doubt clearing class	2	AB	DEC
24.	Practice class/ doubt clearing class	2	AB	DEC
23.	Practice class/ doubt clearing class	2	AB	DEC
22.	Practice class/ doubt clearing class	2	AB	NOV
21.	Practice class/ doubt clearing class	2	AB	NOV
20.	Practice class/ doubt clearing class	2	AB	NOV
19.	Bolting experiment/Avena coleptile bioassay (demonstration).	2	AB	NOV
18.	Rooting from cuttings (demonstration).	2	AB	NOV
17.	Fruit ripening (demonstration).	2	AB	NOV
16	To demonstrate suction due to transpiration.	2	AB	NOV

*** Total 60 Hours adjusted to 58 hours.

SEM V: DISCIPLINE SPECIFIC ELECTIVE COURSE

(NATURAL RESOURCE MANAGEMENT)

CODE: BOTADSE01T (4 Credits)

COURSE OUTCOME: At the end of this course students will be able to:

- Demonstrate an advanced understanding of the application of fundamental principles of ecological studies to the conservation of biodiversity;
- Discuss and cite theories and case studies as prerequisites for success in sustainable utilization and effective species conservation;
- Translate theoretical aspects of contemporary practices to recommendations for environmental management;
- Communicate effectively in the form of written reports and spoken presentations.

LESSON PLAN FOR SEM V

THEORY DSE-1 (BOTADSE01T)

		BAS	IRHA	T CO	LLEGE LI	ESSO	SON PLAN FOR CBCS (FOR BOTANY HONS)								
NAME C	F THE D	EPARTMEN	ΙΤ								ВОТА	NY			
HOD		DR. ARUN	IEEM	A BA	RDHAN										
INITIALS	OF FAC	ULTIES	AC	;	AB	SD	G	SS		ABJ					
PERIOD	OF SEM	ESTER	FRO	M JU	LY 2022	TO [DECEM	BER	2022		HONS			GENER	RAL
											٧				
SEM	5	DSE			01	(CREDIT POINT4Course CodeBOTADSE01T							ADSE01T	
Name o	Jame of the Course NATURAL R						RCE MA	ANA	GEMEN ⁻	Γ					
Course	Course Co-ordinator DR. ARUNE							٩N							
TOTAL N	MARKS	50		TH			٧		TUT				PRA	C	
TOTAL H	HOURS	60 (adjus	ted to	55 ł	nrs)						ı		ı		
UNIT/ S	ECTION/	GROUP/ N	/ODI	JLE/	TOPIC	1	1								
NAME C	OF THE U	NIT/MODU	JLE			N	atural I	Reso	urces			<u> </u>		<u> l </u>	
TOTAL H	HOURS	2 hrs	-	ГНЕО	RY	٧		Т	UTORIA	.L		P	PRAC		
		DISTRIB	UTIO	N OF	LESSON	N PLA	N (MC	DUL	E/ UNI	r/ SECTI	ON/ TO	PIC W	VISE)	I	
SL							<u> </u>			-	HR	Т	EACH	ER	MONTH
1	Introdu	iction and o	defini	tion	of Natur	al Re	al Resources				1 AE		ABJ		AUG
2	2 Types of Natural Resources										1		ABJ		AUG
	TOTA							. 2 Hours							

UNIT/	SECTION/ G	ROUP/ MODULE/	TOPIC	2					
NAMI	E OF THE UNI	T/MODULE		Sustain	able Utiliza	tion			
TOTA	L HOURS	8 hrs (adjusted	THEORY	٧	TUTORIA	L		PRAC	
		to 7 hrs)							
		DISTRIBUTION O	F LESSON PI	LAN (MO	DULE/ UNI	T/ SECTIO	N/ TOP	IC WISE)	
SL		LECTUI	RE HEAD/TO	PIC		Н	IR 1	TEACHER	MONTH
1	Concept of	f sustainable utiliza	ation			1	A	AΒ	AUG
2	Economic a	approaches of sust	ainable utili	zation		1	A	AΒ	AUG
3	Ecological	approaches of sust	tainable utili	ization		1	A	AΒ	AUG
4	Ecological	approaches of sust	tainable utili	ization (c	ontnd.)	1	A	AΒ	AUG
5	Social appr	roaches of sustaina	able utilization	on		1	A	AВ	AUG
6	Cultural ap	proaches of sustai	nable utiliza	ition		1	A	AВ	AUG
7	Q & A disci	ussion class				1	-	AВ	SEPT
8**									
			TOTAL			7	Hours		

^{***} Alloted total 8 hours for unit-2 is adjusted to 7 hours.

UNIT	/ SECTION/	GROUP/ MODULE/ TO	PIC	3				
NAM	IE OF THE UN	NIT/MODULE		Land	•		•	
TOTA	AL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	٧	TUTORIAL		PRAC	
		DISTRIBUTION OF L	ESSON PLAN	N (MOD	OULE/ UNIT/ SE	CTION/ T	OPIC WISE)	
SL		LECTURE HI	AD/TOPIC			HR	TEACHER	MONTH
1	Utilization of	of agricultural land				1	ABJ	AUG
2	Utilization of	of pastoral land				1	ABJ	AUG
3	Utilization of	of horticultural land				1	ABJ	AUG
4	Utilization of	of silvicultural land				1	ABJ	SEPT
5	Soil degrad	ation				1	ABJ	SEPT
6	Soil Manage	ement				1	ABJ	SEPT
7	Q & A discu	ission class				1	ABJ	SEPT
8**				-				
		T01	AL			7 Hours	S	

^{***} Alloted total 8 hours for unit-3 is adjusted to 7 hours.

UNIT/	SECTION/	GROUP/ MODULE/ TOPIC	4						
NAME	OF THE U	NIT/MODULE	Water						
TOTAL	L HOURS	8 hrs (adjusted to 7 hrs)	THEORY	THEORY √ TUTORIAL				PRAC	
		DISTRIBUTION OF LESSON	PLAN (MO	DULE/ UN	IIT/ SECTI	ON/ TOP	IC WISI	Ε)	1
SL		LECTURE HEAD/TO	PIC		HR	TEACH	ER	МО	NTH
1	Concept	of water reservoir of nature			1		AB		SEPT
2	Freshwa	ter-rivers, lakes, ground wate	r		1		AB		SEPT
3	Fresh wa	ater-aquifers, watershed			1		AB		SEPT
4	Marine v	water, Estuarine water			1		AB		SEPT
5	Wetland	S			1		AB		SEPT
6	Threats a	and management strategies o	f water		1		AB		SEPT
7	Question	ns & answers discussion			1		AB		SEPT
8**									
		TOTAL			7 Hour	S			

^{***} Alloted total 8 hours for unit-4 is adjusted to 7 hours.

UNIT/	/ SECTION/	GROUP/ MOD	ULE/ TOPIC	5						
NAMI	E OF THE UN	NIT/MODULE		Biologica	l Resources					
TOTA	L HOURS	12 hrs	THEORY	٧	TUTORIAL		PRAC			
		DISTRIBUTION	ON OF LESSON	PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)						
SL		LE	CTURE HEAD/1	OPIC		HR	TEACHER	MONTH		
1	Biodivers	ity-definition a	nd types			1	AB	NOV		
2	Significan	ce of biodiver	sity			1	AB	NOV		
3	Threats a	nd manageme	nt strategies of	biological	resources	1	AB	NOV		
4	Managen	nent strategies	of biological re	sources		1	AB	NOV		
5	Bioprosp	ecting				1	AB	NOV		
6	IPR					1	AB	NOV		
7	CBD					1	AB	DEC		
8	Nation Bi	odiversity Acti	on Plan			1	AB	DEC		
9	Nation Bi	odiversity Acti	on Plan-Contd.			1	AB	DEC		
10	Doubt cle	earing class				1	AB	DEC		
11	Unit class	test				1	AB	DEC		
12	Bioprosp	ecting				1	AB	DEC		
			TOTAL			12 Hou	ırs	_		

UNIT/	SECTION/ C	GROUP/ MODULE/ TOPIC		6						
NAME	OF THE UN	IT/MODULE		Forests						
TOTAL	. HOURS	6 hrs (adjusted to 5 hrs)	THEORY	٧	TUT	ORIAL	PF	RAC		
		DISTRIBUTION OF LESSON P	LAN (MODU	LE/ UNI	T/ SECT	ION/ TO	PIC WISE)		<u>. I</u>	
SL		LECTURE HEAD/	TOPIC			HR	TEACHER	R	MONTH	
1	Definitio	n of Forest and Cover				1	ABJ		SEPT	
2	Significar	nce of forests with special ref	erence to Inc	lia		1	ABJ		SEPT	
3	Major an	d minor forest products				1	ABJ		SEPT	
4	Depletio	n of forests				1	ABJ		SEPT	
5	Manager	nent of forests				1	ABJ		SEPT	
6**										
		TOTAL				5 Hou	rs			

^{***} Alloted total 6 hours for unit-6 is adjusted to 5 hours.

UNIT/	SECTION	GROUP/ MODULE/ TOPIC		7					
NAME	OF THE U	JNIT/MODULE		Energy					
TOTAL	HOURS	6 hrs (adjusted to 5 hrs)	THEORY	٧	TUTOR	AL		PRAC	
		DISTRIBUTION OF LESSO	ON PLAN (MO	DULE/ UN	IIT/ SECT	ION/ T	OPIC WI	SE)	
SL		LECTURE HEA	D/TOPIC			HR	TEACH	ER	MONTH
1	Renewa	able sources of energy	_	•		1	ABJ		OCT

2	Renewable sources of energy (contnd)	1	ABJ	NOV
3	Non-renewable sources of energy	1	ABJ	NOV
4	Doubt clearing class & QA discussion	1	ABJ	NOV
5	Class test	1	ABJ	NOV
	TOTAL	5 Hou	rs	

^{***} Alloted total 6 hours for unit-7 is adjusted to 5 hours.

UNIT/ S	ECTION/	GROUP/ M	ODULE/ TOPIC	8								
NAME (OF THE U	NIT/MODUI	LE	Conter	nporary prac	tices in	resour	source management				
TOTAL I	HOURS	6 hrs	THEORY	٧	TUTORIA	L		PRAC				
		DISTRIBU	JTION OF LESSON	PLAN (M	ODULE/ UNI	T/ SEC	TION/ T	OPIC WISE)				
SL			LECTURE HEAD	/TOPIC			HR	TEACHER	MONTH			
1	EIA,						1	ABJ	NOV			
2	GIS						1	ABJ	NOV			
3	Particip	atory Resou	rce Appraisal				1	ABJ	NOV			
4	Ecologic	cal footprint	with emphasis or	n carbon f	ootprint		1	ABJ	DEC			
5	Resourc	ce accountin	g				1	ABJ	DEC			
6	Waste r	managemen	t				1	ABJ	DEC			
			Total				6 Hou	rs				

UNIT/	SECTIO	N/ GROUP/	MODULE/ TOPIC	9								
NAME	OF THE	UNIT/MOI	DULE		nal and internati	onal efforts ir	resource mana	gement and				
TOTAL HOURS		4 hrs	THEORY	٧	TUTORIAL		PRAC					
	DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)											
SL			LECTURE HEAD	/TOPIC		HR	TEACHER	MONTH				
1	IUCN	, UNESCO, l	JNEP			1	ABJ	DEC				
2	IBIN,	WBBDB				1	ABJ	DEC				
3	BSI, Z	'SI				1	ABJ	DEC				
4	Doub	t clearing cl	lass and QA discuss	ion		1	ABJ	DEC				
			Total	I 4 Hours								

PRACTICAL

Discipline Specific Elective Course-1

Natural Resource Management (BOTADSE01P)

(CREDIT: 2)

					BASII	RHAT	L COF	LEGE	LESSON	PLAN	N FOR	CBCS (F	OR HO	NS)					
NAM	E OF 1	THE D	EPAR	RTMI	ENT								ВС	'NATC	Y				
HOD				DR	. ARUNE	EMA	BAR	DHAN	J										
INITI	ALS O	F FAC	ULTIE	ES		AC	1	AΒ	SDG	SS		ABJ							
PERIO	OD OF	SEM	ESTE	R	FROM	JULY	2022	2 TO	DECEMB	ER 20)22		HON	S		GE	NER/	\L	
													٧						
SEI	М	5			DSE		01		CREDIT	POI	NT	2	Cou	rse Co	se Code BOTADSE01			ADSE01P	
Name of the Course Natural Resource Management																			
Course Co-ordinator DR. AYANA CHAKRABORTY																			
TOTA	L MA	RKS		25		Т	Н				TUT				F	PRAC	٧	1	
TOTA	L HO	URS		60	Hrs	•													
UNIT	/ SEC	TION/	GRO	UP/	MODU	LE/ T	OPIC				PRAC	CTICAL							
NAM	E OF 1	THE U	INIT/	MOI	DULE						Natu	ral Res	ource N	/lana	gen	nent P	ractic	al	
TOTA	L HO	URS	6	0 H F	<mark>♀</mark> (adjus	sted t	to 54	HRS	THEOR	Υ		TU	UTORIAL			P	PRAC	٧	
			D	ISTR	RIBUTIO	N OF	LESS	ON P	LAN (MC	DUL	E/ UNI	T/ SEC	TION/	ГОРІС	W	ISE)			
SL							T	OPIC						Н	R	TEAC	HER	MONTI	Н
	Unit 1																		
1. Estimation of solid waste generated by a domestic system (biod								degrad	able)	2	2	Α	В	AUG	ì				
2.	Estin	natio	n of so	olid	waste ge	enera	ated k	y a d	omestic	syste	m (bio	degrad	able)	. 2	2			AUG	ì
	Repe	eat pr	actica	al															
3.	3. Estimation of solid waste generated by a domestic system (non biodegrad									gradab	le 2	e 2 AB AL			AUG	ì			

4.	Estimation of solid waste generated by a domestic system (non biodegradable) repeat practical	2		AUG
	Unit 2			
5.	Collection of data on vegetation covers of specific area	2	AB	AUG
6.	Collection of data on vegetation covers of specific area repeat practical			SEPT
	Unit 3			
7.	Measurement of dominance of woody species by DBH (diameter	2	AB	SEPT
	at breast height) method			
8.	Measurement of dominance of woody species by DBH (diameter			SEPT
	at breast height) method repeat practical			
	Unit 4			
9.	Calculation and analysis of ecological footprint.	2	AB	SEPT
10.	Practice class/ doubt clearing class	2	AB	SEPT
11.	Practice class/ doubt clearing class	2	AB	SEPT
12.	Practice class/ doubt clearing class	2	AB	SEPT
13.	Practice class/ doubt clearing class	2	AB	SEPT
14.	Practice class/ doubt clearing class	2	AB	SEPT
15.	Practice class/ doubt clearing class	2	AB	NOV
16.	Practice class/ doubt clearing class	2	AB	NOV
17.	Practice class/ doubt clearing class	2	AB	NOV
18.	Practice class/ doubt clearing class	2	AB	NOV
19.	Practice class/ doubt clearing class	2	AB	NOV
20.	Practice class/ doubt clearing class	2	AB	NOV
21.	Practice class/ doubt clearing class	2	AB	DEC
22.	Practice class/ doubt clearing class	2	AB	DEC
23.	Practice class/ doubt clearing class	2	AB	DEC
24.	Practice class/ doubt clearing class	2	AB	DEC
25.	Practice class/ doubt clearing class	2	AB	DEC
26.	Practice class/ doubt clearing class	2	AB	DEC
27.	Practice class/ doubt clearing class	2	AB	DEC
28.	Practice class/ doubt clearing class	-	-	-
29.	Practice class/ doubt clearing class	-	-	-
30.	Practice class/ doubt clearing class	-	-	-
	TOTAL	54 H	RS	

***1	otal 60	Hours	adjusted	to	54	hours.
			•			

Discipline Specific Elective Course-2

Industrial and Environmental Microbiology (BOTADSE03T)

	BASIRHAT COLLEGE LESSON PLAN FOR CBCS (FOR BOTANY HONS)												
NAME C	OF THE D	EPARTM	ENT							BOTAN	ΙΥ		
HOD		DR. ARU	NEEM	A BARDH	AN								
INITIALS	OF FAC	ULTIES	AC	AB	SE)G	SS		ABJ	GL			
PERIOD	OF SEM	ESTER	FRON	/I JULY 20)22 TO	DECE	MBE	R 2022		HONS	6	GEN	ERAL
										٧			
SEM	5	DSE		03		CREDI	T PO	INT	4	Cours	se Code	ВС	TADSE03T
Name o	f the Co	urse			Indu	strial	and E	Environr	nental N	∕licrobio	logy		
Course	Co-ordin	nator			DR.	ARUN	EEMA	4 BARDI	HAN				
TOTAL N	MARKS	50			TH	٧		TUT			PR	AC	
TOTAL H	TOTAL HOURS 60 (adjusted to 53 hrs)												
TOTAL HOURS OF (adjusted to 33 ms)													
UNIT/ S	ECTION	/ GROUP/	MOD	ULE/ TOI	PIC		1						
NAME C	OF THE U	JNIT/MO	OULE			Scope of microbes in industry and environn						nment	
TOTAL		6 hrs			THE	ORY	٧	T	UTORIA	L	PR	AC	
HOURS		(adjusted											
		DISTRIB	JTION	OF LESS	ON PLA	M (M	DDUI	LE/ UNI	T/ SECTI	ON/ TO	PIC WISI	E)	
SL			LE	CTURE H	EAD/T	OPIC				HR	TEACI	HER	MONTH
1		ıction to I				menta	l mic	robiolo	gy	1	AC	:	AUG
2	Scope of	of microbi	ology	in indust	ry					1	AC	<u> </u>	AUG
3	Scope of microbiology in environme									1	AC	<u> </u>	AUG
4	QA disc	cussion								1	AC	:	SEPT
5													
6													
	TOTAL 4 Hours												

^{**} Allotted total 6 hours for unit-1 is adjusted to 4 hours.

UNIT	SECTION/ GROUP	P/ MODULE/ TOPIC	•	2						
NAMI	E OF THE UNIT/MO	DDULE		Bioreactors/Fermenters and fermentation processes						
ΤΟΤΔ	L HOURS	12 hrs (adjusted	THEORY	V	TUTOR	ΙΔΙ	PRAC			
		to 10 hrs)		, i				TitAe		
DISTR	IBUTION OF LESSO	ON PLAN (MODULE	/ UNIT/ SECT	ION/ TOP	IC WISE)					
SL	LECTURE HEAD/	TOPIC		HR	TEACHER	MONTH				
1	Fermentation: So	olid-state (stationar	y and submer	ged) ferm	entation	S	1	SS	AUG	
2	Fermentation: lic	quid-state (stational	ry and subme	rged) fern	nentation	าร	1	SS	AUG	
3	Batch and contin		1	SS	AUG					
4	Components of a		1	SS	AUG					
5	Types of bioreact	tors-laboratory and	pilot scale fe	rmenters			1	SS	AUG	
6	Types of bioreact	tors- production fer	menters				1	SS	AUG	
7	Types of bioreact	tors-Constantly stire	red tank ferm	enter, tov	ver		1	SS	AUG	
	fermenter							33	AUG	
8	Types of bioreact	tors-fixed bed and f	luidized bed b	oioreactor	S		1	SS	AUG	
9	Types of bioreact	tors -Air-lift fermen	ter				1	SS	SEPT	
10	QA discussion		1	SS	SEPT					
11				•	•					
12	12									
		TOTAL		· · · · · · · · · · · · · · · · · · ·				10 HOURS		

A visit to any educational institute/ industry to see an industrial fermenter, and other downstream processing operations.

^{**} Allotted total 12 hours for unit-2 is adjusted to 10 hours.

UNIT	/ SECTION	ON/ GROUP/ MODUL	E/ TOPIC	3							
NAM	IE OF TH	IE UNIT/MODULE		Microbial production of industrial products							
TOTA		12 hrs (adjusted to 11 hrs)	THEORY	1	TUTORIAL		PRA	ıc			
DIST	RIBUTIC	ON OF LESSON PLAN (MODULE/ U	NIT/ SI	ECTION/ TOPIC	WISE)					
SL	LECTU	RE HEAD/ TOPIC		HR	TEACHER	MONTH					
1	Micro	organisms involved in	industrial pr	oducti	on process		1	AC	SEPT		
2	Media	used.					1	AC	SEPT		
3	Ferme	ntation conditions, do	wnstream p	rocess	ing and uses		1	AC	OCT		
4	Filtrati	ion, centrifugation					1	AC	NOV		
5	Solver	nt extraction,, cell disr	uption				1	AC	NOV		
6	Precip	itation and ultrafiltrat	ion				1	AC	NOV		
7	Lyoph	ilization, spray drying					1	AC	NOV		
8		on microbial ferment		•			1	AC	DEC		
9		on microbial ferment ative and quantitative		•			1	AC	DEC		
10		on microbial ferment ative and quantitative		•		mation	1	AC	DEC		
11		on microbial ferment ative and quantitative	mation	1 AC		DEC					
12											
	•		TOTAL				11 hr	·s			

	UNIT/ SECTIO	N/ GROUP/ MODULE/	TOPIC	4							
	NAME	Microbial enzymes of industrial interest and enzyme immobilization									
TO	TAL HOURS	8 hrs	V	TUTORI	AL	PRAC					
	DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL		LECTURE HE	AD/ TOPIC				HR	TEACHER	MONTH		
1	Microorganis	ms for industrial applic		1	SS	SEPT					
2	Hands on scre	eening microorganisms		1	SS	SEPT					
3	Hands on scre	eening microorganisms	starch hydroly	sis			1	SS	SEPT		
4	Hands on scre	eening microorganisms	cellulose hydro	olysis			1	SS	SEPT		
5	Methods of ir immobilization	nmobilization, advanta on,	ges and applica	ations	of		1	SS	SEPT		
6	large scale ap	plications of immobiliz	rase).	1	SS	SEPT					
7	large scale ap	plications of immobiliz	ase).	1	SS	NOV					
8	Doubt clearin	g class		1	SS	NOV					
		TOTAL		8 HOUR	ıs						

^{***} Screening methodology to be practiced using online platform/ and video mode.

UNIT/ SECTION	I/ GROUP/ MODULE	/ TOPIC	5							
NAME OF THE	UNIT/MODULE		Microbes and quality of environment							
TOTAL HOURS	6 hrs (adjusted	THEORY	1	TUTOR	AL		PRAC			
	to 5 hrs)									
DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	LECTURE HEAD/ TO	PIC			HR	TEACHER	M	ONTH		
1	Distribution of micro	bes in air			1	SS		NOV		
2	Isolation of microors	ganisms from s	oil		1	SS		NOV		
3	Isolation of microors	ganisms from a	ir		1	SS		NOV		
4	Isolation of microorg	ganisms from v	vater		1	SS		NOV		
	Class Test			1	SS		DEC			
6**										
	TOTA			5 HOUR	RS	*				

^{**} Alloted total 6 hours for unit-5 is adjusted to 5 hours.

UNIT	/ SECTION/ GRO	OUP/ MODULE/	TOPIC	6						
NAM	E OF THE UNIT/	/MODULE		Microbi	Microbial flora of water					
TOTA	AL HOURS	8 hrs	THEORY	√	TUTORIA	۱L		PRAC		
	DIST	OPIC WISE)								
SL	LECTURE HEA	AD/ TOPIC				HR	TEACHER	MONTH		
1	Water pollut	ion	1	GL	AUG					
2	Role of micro	bes in sewage v	1	GL	AUG					
3	Role of micro	bes in domestic	waste water t	reatment	systems	1	GL	AUG		
4	Determination	on of BOD, COD	of water sampl	es		1	GL	SEPT		
5	Determination	on of TDS and TC	C of water san	nples		1	GL	SEPT		
6	Microorganis	sms as indicators	of water quali	ty,		1	GL	SEPT		
7	Check colifor	m and faecal co	1	GL	SEPT					
8	QA discussio	n		1	GL	OCT				
	•	TOTA	8 HOU	RS	<u> </u>					

UNIT	/ SECTION/ G	ROUP/ MODULE/ TOPIC		7							
NAM	E OF THE UNI	T/MODULE	Microbes in agriculture and remediation of contaminated soils.								
ТОТА	AL HOURS	8 hrs (adjusted to 7 hrs)	THEORY	1	TUTORIAL		PRAC				
	DISTRIBUTION OF LESSON PLAN (MODULE/ UNIT/ SECTION/ TOPIC WISE)										
SL	LECTURE H	EAD/ TOPIC		HR	TEACHER		MONTH				
1	Brief idea a	bout microbes in agricult	ure and		1	GL		NOV			
	remediation	n process									
2	Biological fi	xation			1	GL		NOV			
3	Mycorrhiza	е			1	SS		DEC			
4	Bioremedia	tion of contaminated soil	S		1	SS		DEC			
5	Isolation of	root nodulating bacteria			1	SS		DEC			
6	Arbuscular	mycorrhizal colonization	in plant root	S	1	SS		DEC			
7	Doubt clear	ing class		1	SS		DEC				
8					•						
		TOTAL		7 HOURS							

^{**} Alloted total 8 hours for unit-7 is adjusted to 7 hours.

^{***} The allotted total 60 hours for this course has been adjusted to 53 hours, keeping the course content unchanged.

Discipline Specific Elective Course- 2 Practical

Industrial and Environmental Microbiology (BOTADSE03P)

					BASIRE	IAT CO	LLEGE	LESS	ON P	LAN	FOR CE	BCS (FC	OR H	ONS)			
NAME	E OF	THE DE	PAR	TME	ENT								В	OTA	NY			
HOD				DR	. ARUNE	EMA B	ARDH/	ΔN										
INITIA	ALS O	F FACL	JLTIE	S		AC	AB	S	DG	SS		ABJ	GL					
PERIC	D OF	SEME	STER	₹	FROM	JULY 20	JLY 2022 TO DECEMBER 2022 HO				HONS √			NEF	RAL			
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SEM 5					DSE	02						2			0			DCEOOD
SEN	VI	5	•			02		C	KEDII	REDIT POINT 2		Course Code			B	BOTADSE03P		
Name	of th	ne Cou	rse			Ind	ustrial	and	Enviro	onm	ental M	1icrobi	ology	,				
Cours	e Co-	ordina	ator			DR.	AYAN	A CH	IAKRA	BOF	RTY							
TOTA	L MA	RKS		25		TH					TUT					PRAC		٧
TOTAL HOURS 60						TH			TUT							PRAC		٧
UNIT/	SEC ⁻	TION/	GRO	UP/	MODUL	E/ TOF	PIC		PRAC	CTIC	AL							
NAME	E OF	THE UI	NIT/N	MOD	ULE				Indus	stria	l and Er	nviron	nent	al M	icrobi	ology P	ract	ical
TOTA	L HO	URS		60 F	HRS	THE	EORY TUTORIAL					PRAC		AC	٧			
			DIS	TRIE	BUTION	OF LESS	SON P	LAN	(MOD	ULE	/ UNIT	/ SECT	ION/	TOF	PIC WI	SE)		
SL						1	OPIC						HF	3	TEACHE	R	MONTH	
	Uni	t 1																
1.	Prir	ciples	and	fun	ctioning	of inst	rume	nts (Micro	sco	pe and	Autoc	lave)		2	SS		AUG
					borator			`			•		- /					
2.					ctioning		trume	nts (Hot ai	r ov	en and	Lamii	nar a	i	2	SS		AUG
	flov	v) in n	nicro	biol	ogy lab	oratory												
3.					ctioning		trume	nts (Incub	ator	and De	eep fre	ezer))	2	SS		AUG
1					borator			nts (Dues -	n L.		o +1 = -	to or		2			CEDT
4.	Principles and functioning of instruments (Bunsen burner, hot plate an water bath) in microbiology laboratory								ie an	4	²	SS		SEPT				
5.					ctioning				maone	etic	stirrer :	and mi	cro		2	SS		SEPT
J.					iology la			iito (I	magn	J LIC	Stille!	ana m			-	33		JLI I

6.	Principles and functioning of instruments (Spectrophotometer and pH	2	SS	SEPT
	meter) in microbiology laboratory			
7.	Principles and functioning of instruments (Water distiller and Vortex	2	SS	SEPT
	mixture) in microbiology laboratory (through video/ ppt. only)			
8.	Principles and functioning of instruments (Analytical balance and	2	SS	ОСТ
	Colony counter) in microbiology laboratory			
9.	Principles and functioning of instruments (Homogenizer and	2	SS	NOV
	Centrifuge) in microbiology laboratory (through video/ ppt. only)			
	Unit 2			
10.	Hands on sterilization techniques.	2	SS	NOV
11.	Preparation of culture media (PDA)	2	SS	NOV
12.	Preparation of culture media(NA)	2	SS	NOV
13.	Practice class/ doubt clearing class	2	SS	DEC
14.	Practice class/ doubt clearing class	2	SS	DEC
15.	Practice class/ doubt clearing class	2	SS	DEC
16.	Practice class/ doubt clearing class		GL	
17.	Practice class/ doubt clearing class		GL	
18.	Practice class/ doubt clearing class		GL	
19.	Practice class/ doubt clearing class		GL	
20.	Practice class/ doubt clearing class		GL	
21.	Practice class/ doubt clearing class		GL	
22.	Practice class/ doubt clearing class		GL	
23.	Practice class/ doubt clearing class		GL	
24.	Practice class/ doubt clearing class		GL	
25.	Practice class/ doubt clearing class		GL	
26.	Practice class/ doubt clearing class		GL	
27.	Practice class/ doubt clearing class		GL	
28.	Practice class/ doubt clearing class		GL	
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*** Tota	l 60	Hours	ad	justed	to	30	hours.
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