LESSON PLAN: 2018-2019 – SEMESTER I, SEMESTER II, PART II (HONOURS & GENERAL)

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SACT II, DEPARTMENT OF BOTANY

SEMESTER I HONOURS

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
				LECTURES	
2018-	PHYCOLOGY &	PHYCOLOGY	1.GENERAL ACCOUNT-		JULY'18
2019	MICROBIOLOGY		1.1. Thallus	5	то
			organization, Structure		DECEMBER
	BOT-A-CC-1-1-TH		of algal cell, 1.2.		'18
	THEORETICAL		Plastids and Flagella		
	In Eonemona		1.3. Origin and evolution		
			of sex, 1.4. Life cycle		
			patterns, 1.5. Significant		
			contributions of		
			important phycologists		
			(Fritsch, Smith, K. N. Singh, T.V. Desikachary		
			H.D. Kumar, M.O.P.		
			lyengar)		
			2. Classification:		
			2.1Criteria and basis of	5	
			Fritsch's classification		
			2.2Classification by Lee		
			with examples		
			2.3Salient features of		
			Cyanobacteria,		
			Rhodophyta,		
			Chlorophyta,		
			Charophyta, Bacillarionhyta		
			Xanthophyta,		
			Phaeophyta,		
			Heterokontophyta.		
			3.Cyanobacteria:	Л	
			3.1. Ultrastructure of	4	
			cell, 3.2. Heterocyst -		
			structure and function,		
			3.3. ECOlogy. A Bacillarionhyta: A 1		
			Cell structure. 4.2. Cell	6	
			division, 4.3. Auxospore		
			formation in Centrales		
			and Pennales.	10	
			5. Life History:	CHALK &	
			5.1 Chiuniyaomonas, 5.2 Oedogonium 5.2	TALK, PPT,	
			Chara, 5.4. Ectocarpus,	CHARTS.	
			5.5. Polysiphonia, 5.6.		
			Evolutionary significance		
			of Prochloron.		
			1 Work out of the		
	PHYCOLOGY &	PHYCOLOGY	following algae with	30	
	MICROBIOLOGY		reproductive structure		
	BOT-A-CC-1-1-P		(Free hand drawing		

			and drawingunder drawing prism with magnification): Oedogonium, Chara, Ectocarpus. 2.Study of (a) Permanent slides: Gloeotrichia, Volvox, Vaucheria, Coleochaete, Polysiphonia, Centric and Pennate diatom; (b) Macroscopic specimens: Laminaria, Sargassum.	LABORATORY METHODS	JULY'18 TO DECEMBER '18
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SEMESTER II HONOURS

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
				LECTURES	
2018- 2019	ARCHAEOGONIATE BOT-A-CC-2-4-TH THEORETICAL	GYMNOSPERMS	 1.Classification of vascular plants by Gifford & Foster(1989) up to division (Progymnospermophyta to Gnetophyta) with diagnostic characters and examples. 2.Progymnosperms :2.1 Diagnostic characters of the group, 2.2.Vegetative and reproductive features of <i>Archeopteris</i>, 2.3.Phylogenetic importance. 3.Life History : Distribution in India; Vegetative and Reproductive structure of sporophyte, Development of gametophyte in : 3.1. Cycas , 3.2. Pinus and 3.3. Gnetum. 4.Economic Importance with reference to Wood, Resins, Essential oils, and Drugs. 	4 6 8 4 CHALK & TALK, PPT, CHARTS.	JANUARY '19 TO JUNE'19

BOT-A-CC-2-4-P	BRYOPHYTES,	BRYOPHYTES	6	JANUARY
PRACTICAL	PTERIDOPHYTES,	1. Morphological study of		'19 TO
	GYMNOSPERMS	the plant body: Genera		JUNE'19
		as mentioned in		
		Riccia Porella		
		2.Study from permanent		
		slides : Riccia (V.S. of		
		thallus with sporophyte),		
		Marchantia (L.S. through		
		gemma cup,		
		antheridiophore,		
		archegoniophore),		
		Anthoceros (L.S. Of sporophyto) Euparia		
		(LS of cansule)		
		PTERIDOPHYTES		
		1.Morphological study	18	
		of the sporophytic plant	10	
		body: Genera as		
		mentioned in the		
		theoreticalsyllabus and		
		Contrologium,		
		Marsilea.		
		2.Workout of the		
		reproductive structures:		
		Selaginella, Equisetum,		
		Pteris.		
		3.Study from		
		Psilotum (T.S. of		
		synangium),		
		Lycopodium (L.S. of		
		strobilus),		
		Ophioglossum (L.S. of		
		spike), Dryopteris		
		(gametopnyte), <i>Warshea</i>		
		GYMNOSPERMS		
		1.Morphological study:	6	
		Cycas (microsporophyll	ס	
		and megasporophyll),		
		Pinus (female and male		
		cone), Construm (formale and	LABORATORY	
		Grietum (Temale and	METHODS	
		2.Study from		
		permanent slides: Cycas		
		(L.S. of ovule), Pinus		
		(L.S. of male and female		
		cone), Ginkgo		
		(L.S. OF remaie stropilus),		
		cone and ovule).		

SEMESTER I GENERAL

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
				LECTURES	
2018- 2019	PLANT DIVERSITY BOT-G-CC-1-1- TH THEORETICAL	PHYCOLOGY	2.Phycology 2.1 Diagnostic characters and examples of Cyanophyceae, Rhodophyceae, Chlorophyceae and Phaeophyceae and Phaeophyceae, 2.2 Classification: Criteria and system of Fritsch, 2.3. Life histories of <i>Chlamydomonas, Chara</i> and <i>Ectocarpus</i> , 2.4. Role of algae in the environment, agriculture, biotechnology and industry.	14 CHALK & TALK, PPT, CHARTS.	JULY'18 TO DECEMBER'18
	BOT-G-CC-1-1- P PRACTICAL	PHYCOLOGY MYCOLOGY BRYOPHYTES	1.Work out: Microscopic preparation, drawing and labeling of <i>Chlamydomonas, Chara,</i> <i>Ectocarpus, Rhizopus</i> and <i>Ascobolus</i> 3.Identification with reasons: 3a. Cryptogamic specimens (macroscopic/microscopic as prescribed in the theoretical syllabus	30 LABORATORY METHODS	JULY'18 TO DECEMBER'18

SEMESTER II GENERAL

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
				LECTURES	
2018- 2019	PLANT DIVERSITY II BOT-G-CC-2-2- TH THEORETICAL	PTERIDOPHYTES	1. Pteridophytes 1.1Diagnostic characters and examples of Psilophyta, Lycophyta, Sphenophyta & Filicophyta(Gifford & Foster 1989). 1.2 Life histories of <i>Selaginella</i> and <i>Pteris</i> , 1.3 Economic	12	JANUARY'19 TO JUNE'19
		GYMNOSPERMS PALAEOBOTANY & PALYNOLOGY	importance. 2.Gymnosperms 2.1Progymnosperms (brief idea), 2.2 Diagnostic characters and examples of Cycadophyta, Coniferophyta and Gnetophyta (Gifford & Foster 1989), 2.3 Life histories of <i>Cycas</i> and <i>Pinus</i> , 2.4 <i>Williamsonia</i> (reconstructed), 2.5 Economic importance of Gymnosperms. 3. Paleobotany & Palynology 3.1Fossil, fossilization process and factors of fossilization, 3.2	12 10 СНАLК & ТАГК	
			Importance of fossil study. 3.3Geological time scale, 3.4 Palynology - Definition, spore & pollen (brief idea), Applications.	PPT, CHARTS	

PART II - 2nd YEAR HONOURS

YEAR	PAPER	UNIT	ТОРІС	NO. OF LECTURE	SESSION
2018-2019		PTERIDOPHYTES	 General Account : General Account : Clonisation and rise of early land plants , 1.2. Classification of vascular plantsby Gifford & Foster (1989) uptodivision	12 CHARTS, CHALK AND TALK AND PPT.	JULY TO PRE-PUJA
		GYMNOSPERMS	1. <i>Classification</i> of vascularplants by Gifford & Foster (1989) upto division (Progymnospermophyta toGnetophyta) with diagnostic characters andexamples. 3. <i>Life History</i> : Distribution in India; Vegetativeand Reproductive structure of sporophyte, Development of gametophyte and Embryogeny in : 3.1. <i>Cycas</i> 3.2. <i>Pinus.</i>		
	111	PTERIDOPHYTES	 4. Dryopteris. 3. Fossil Pteridophytes : Structural features, Geological distribution and Evolutionary significance of 3.1. Rhynia, 3.2. Lepidodendron (Reconstructed), 3.3. Calamites (Reconstructed). 	22 CHARTS, CHALK AND TALK, PPT	POST- PUJATO WINTER VACATIO N

		 4. Telome concept and its significance in the origin of different groups of Pteridophytes. 5. Heterospory and Origin ofSeed habit. 6. Economic importance as food, medicine and Agriculture. 		
III	GYMNOSPERMS	3. <i>Life History</i> : Distribution in India; Vegetativeand Reproductive structure of sporophyte, Development of gametophyte and Embryogeny in 3.3. <i>Gnetum</i>		
	GYMNOSPERMS	 Progymnosperms : 2.1. Diagnostic characters of the group, 2.2. Vegetative andreproductive features of <i>Archeopteris</i>, 2.3. Phylogenetic importance. <i>Fossil gymnosperms</i> : Structural features and Geological distribution of reconstructed genera: 4.1. <i>Lyginopteris</i>, 4.2. <i>Williamsonia</i>,4.3. <i>Cordaites</i>. <i>Economic Importance</i> withreference to Wood, Resins, Essential oils, and Drugs 	15 CHARTS , CHALK AND TALK AND PPT	POST- WINTER VACATIO N TO TEST
IV B PRACT ICAL	PTERIDOPHYTES	 Morphological study of the sporophytic plant body: Generaas mentioned in the theoreticalsyllabus and <i>Lycopodium, Ophioglossum,</i> <i>Marsilea</i> and <i>Pteris.</i> Workout of the reproductivestructures : <i>Selaginella</i> 	12	JULY TO PRE-PUJA

	PTERIDOPHYTES	 Study from permanent slides Psilotum (T.S. of synangium), Lycopodium (L.S. of strobilus), Ophioglossum (L.S. of spike), Dryopteris (gametophyte), Marsilea (L.S. of sporocarp) Workout of the reproductive structures : Equisetum , Pteris. 	18	POST- PUJA TO WINTER VACATIO N
IV B PRACT ICAL	PALAEOBOTANY	 Morphological study : <i>Ptilophyllum</i> and <i>Glossopteris</i> leaf fossils. Study from permanent slides : T.S.of stem of <i>Rhynia,Lepidodendron,</i> <i>Calamites, Lyginopteris,</i> <i>Cordaites.</i> 	9 LABORAT -ORY METHOD	POST- WINTER VACATIO NTO TEST
IV B PRACT ICAL	GYMNOSPERMS	1.Morphological study: <i>Cycas</i> (microsporophyll and megasporophyll), <i>Pinus</i> (female and male cone), <i>Gnetum</i> (female and male cone). Study from permanent slides: <i>Cycas</i> (L.S. of ovule), <i>Pinus</i> (L.S. of male and female cone), <i>Ginkgo</i> (L.S.of female strobilus), <i>Gnetum</i> (L.S. of male cone and ovule).		

PART II - 2ND YEAR GENERAL

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
				LECTURES	
2018- 2019	III PRACTICAL	MODULE V	 Cryptogams: Work out,microscopic preparation, drawing and labeling, description and identification of the following cryptogams: <i>Chara, Ectocarpus,.</i> Angiosperms: Dissection, drawing andlabeling, description of angiospermic plants andfloral parts, floral formula and floral diagram, identification (family) from the following families: Leguminosae (Fabaceae), Malvaceae, Solanaceae. Morphology: Inflorescence types. 	15	JULY TO PRE- PUJA
		MODULE V	 3. Identification withreasons: Cryptogamic specimens (macroscopic/microscopic) as prescribed in the theoretical syllabus. Gymnosperms: Macroscopic - male and female strobilus of Cycas, and Pinus Anatomical slides (stelar types, transfusion tissue, sieve tube, sunken stomata, lenticel). ANGIOSPERMS:Dissection, drawing and labeling, description of angiospermic plants and floral parts, floral formula and floral diagram, identificaiton (family) from the following families 	18	POST-PUJA TOWINTER VACATION

		Labiatae (Lamiaceae),		
		Acanthaceae		
	MODULE V	Cryptogams: Work out,	21	POST-
		microscopic preparation,		WINTER
		drawing and labeling,		VACATION
		description and		TOTEST
		identification of the		
		following cryptogams:		
		Rhizopus, Ascobolus		
		4. Spot identification		
		(Scientific names and		
		families) of the		
		followingAngiospermic		
		plants: Sida rhombifolia		
		(Malvaceae), Abutilon		
		indicum (Malvaceae),		
		Thespesia populnea		
		(Malvaceae), Cassia		
		sophera (Fabaceae),		
		Tephrosia hamiltonii		
		(Fabaceae) <i>, Crotalaria</i>		
		pallida		
		(Fabaceae) <i>, Leucaena</i>		
		leucocephala		
		(Fabaceae), <i>Coccinia</i>		
		grandis (Cucurbitaceae),		
		Solanumsisymbriifolium		
		(Solanaceae),. <i>Nicotiana</i>		
		plumbaginifolia		
		(Solanaceae), Physalis		
		<i>minima</i> (Solanaceae),		
		Leucas aspera		
		(Lamiaceae), <i>Leonurus</i>		
		sibiricus (Lamiaceae),		
		Anisomelessindica		
		(Lamiaceae),		
		Parthenium		
		hysterophorus		
		(Asteraceae), Tridax		
		procumbens		
		(Asteraceae), <i>Mikania</i>		
		scandens (Asteraceae),		
		Eclipta prostrata		
		(Asteraceae), Eragrostis		
		tenella (Poaceae),		
		Chrysopogon aciculatus		
		(Poaceae), Eleusine		
		inuica (Poaceae), Vanad		
		(Orchidaccae)		
		(Orchidaceae).		

LESSON PLAN(Semester 1 ,semester2, partII and partIII Hons. & General.

NAME: SMT SHARMISTHA BASU

DEPARTMENT: BOTANY

Semester1 HONOURS

YEAR	PAPER	UNIT	ТОРІС	NO. OF LECTURES	SESSION
2018-19	CORE COURSE 1 PHYCOLOGY AND MICROBIOLOGY (BOT-A-CC-1- 1-TH) THEORETICAL	Microbiology	MICROBIOLOGY 1. Virus: 1.1. Discovery, 1.2.Plant virus- types, 1.3. Transmission and translocation of Plant virus, 1.4. TMV-	6 CHALK AND TALK , PPT	July to December
			2. Bacteria: 2.1. Discovery, .2.2. Distinguishing features of Archaea and Bacteria, 2.3. Characteristics of some major groups: Proteobacteria (Enterobacteria), Firmicutes, Mollicutes, Actinobacteria, Spirochaetes, Chlamydiae, 2.4. Bacterial growth curve and generation time, 2.5.Flagella (ultrastructure) & Pilli, 2.6. Cell wall – chemical structure and differences between Gram +ve & Gram – ve bacteria, 2.7. Bacterial genome and plasmid, 2.8. Endospore – formation, structure and function, 2.9.Genetic Recombination (a) Transformation – with special emphasis on Natural and Induced competence and DNA uptake, (b)	20 CHALK AND TALK , PPT	July to December

Conjugation— F- factor, F+ X F-, Hfr X F-, concept of F', chromosome mobilization, (c) Transduction- Generalised and specialized Practical		
Gram staining from bacterial culture. 4. Microscopic examination of bacteria from natural habitat (curd) by simple staining.	Laboratory method 3	

Semester 2 HONOURS

Year	Paper	Unit	Торіс	No. Of lectures	Session
2018-19	Archegoniate (BOT-A-CC-2-4- TH,	Pteridophytes	1. General Account: 1.1. Colonisation and rise of early land plants, 1.2. Classification of vascular plants by Gifford & Foster (1989) upto division (Rhyniophyta to Filicophyta) with diagnostic characters and examples.	4	January to june
			Sporophyte structure, Reproduction and Structure of gametophyte in 2.1. Psilotum, 2.2. Selaginella, 2.3. Equisetum, 2.4. Pteris.	8	
			 Telome concept and its significance in the origin of different 	8	

	groups of Pteridophytes.		
	4. Heterospory and Origin of Seed habit.	4	
	5. Economic importance as food, medicine and Agriculture. .2 lectures	2	

LESSON PLAN

$\mathrm{II}^{\mathrm{nd}}$ YEAR HONS.

NAME: MS SHARMISTHA BASU

DEPARTMENT: BOTANY

YEAR	PAPER	UNIT	TOPIC	NO. OF LECTURES	SESSION
YEAR 2018-19	PAPER	ECOLOGY	TOPIC ECOLOGY 3. 3.1. Plant indicators (metallophytes); 3.2. Phytoremediation. 4. Conservation of Biodiversity: 9 4.1. Level of Biodiversity: genetic, species & ecosystem diversity. 4.2	NO. OF LECTURES	SESSION JULY TO PRE- PUJA
			Biodiversity, 4.2. Biodiversity hot spots- criteria, Indian hotspots, 4.3. In- situ and ex-situ conservation, 4.4. Seed-banks, 4.5. Cryopreservation,		

	PLANT GEOGRAPHY	4.6. Geographic Information System and Remote Sensing (brief idea). PLANT GEOGRAPHY 5. Phytogeographical regions : 5.1. Phytogeographical regions of India (Chatterjee 1960); 5.2. Dominant flora of Eastern Himalaya, Western Himalaya and Sunderban.	3 CHALK AND TALK , PPT	
III	ECOLOGY PLANT GEOGRAPHY	1. Preliminary idea on : 1.1. Habitat and Niche, 1.2. Ecotone and edge-effect, 1.3. Microclimate, 1.4. Ecads, ecotype and ecoclines, 1.5. Carrying capacity. 6. Endemism : 6.1. Endemic types and Factors; 6.2. Age	4	POST-PUJA TO WINTER VACATION
		& Area hypothesis and Epibiotic theory; 6.3. Endemism in Indian flora.	CHALK AND TALK , PPT	
III	ECOLOGY	2. <i>Community</i> <i>ecology</i> : 2.1. Community- Characteristics and diversity, 2.2. Ecological	4	POST- WINTER VACATION TO TEST

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LESSON PLAN

IIIrd YEAR HONS.

NAME: SMT SHARMISTHA BASU

DEPARTMENT: BOTANY

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
2018-19	VI	PLANT BIOTECHNOLOGY	PLANT BIOTECHNOLOGY 1. Plant tissue culture – Introduction: 1.1. Cellular totipotency, 1.2. Tissue culture media, 1.3. Aseptic manipulation.	2	JULY TO PRE-PUJA
			2. <i>Callus culture</i> : 2.1. Callus initiation, growth and maintenance, 2.2. Applications.	2	
			3. <i>Micropropagation</i> : 3.1. Organogenesis (direct and indirect), 3.2. Somatic embryogenesis, Artificial seed, 3.3. Significance.	2	

		4. <i>Haploid Culture</i> : 4.1. Anther and Pollen culture methods, 4.2. Significance .	2 CHALK AND TALK AND PPT	
VI	PLANT BIOTECHNOLOGY	5. Protoplast Culture : 5.1. Protoplast isolation and culture, 5.2. Protoplast fusion (somatic hybridization), 5.3. Significance. 6. Plant Genetic Engineering : 6.1. Brief concept of different gene transfer methods, special emphasis on Agrobacterium mediated gene transfer, Role of Reporter gene, 6.2. Achievements in crop biotechnology (suitable examples of transgenic plants).	2 2 CHALK AND TALK AND PPT	POST-PUJA TO WINTER VACATION
VI	PLANT BREEDING AND BIOMETRY	PLANT BREEDING 1. Plant Breeding: 14 1.1 Maintenance of germplasm, 1.2 Mass selection and Pure line selection, 1.3 Back cross method, 1.4. Heterosis and	6	POST- WINTER VACATION TO TEST

		hybrid seed production, 1.5. Male sterility and its use in plant breeding, 1.6 Molecular Breeding (use of DNA markers in plant breeding).	CHALK AND TALK AND PPT	
VIII(PRACTICAL)	MICROBIOLOGY	MICROBIOLOGY 1. Preparation of bacterial media – (a) Nutrient agar and nutrient broth, (b) Preparation of slants and pouring Petriplates.	3	JULY TO PRE-PUJA
		2. Sub-culturing of bacterial culture.	3	
	PLANT PATHOLOGY	 Preparation of fungal media (PDA). Sterilization process. Isolation of pathogen from diseased leaf. Inoculation of fruit and subculturing. 	LABORATORY METHOD	
VIII(PRACTICAL)	MICROBIOLOGY	 Gram staining from bacterial culture. Microscopic examination of bacteria from natural habitat(curd) by simple staining. 	3 3	POST-PUJA TO WINTER VACATION

VIII(PRACTICAL)	PLANT PATHOLOGY	5. Identification : Pathological specimens of Brown spot of rice,	3	POST WINTER VACATION TO TEST
		Bacterial blight of rice ,Loose smut of wheat, Stem rot of jute, Late blight of potato; Slides of uredial, telial, pycnial & aecial stages of <i>Puccinia</i> <i>graminis</i> .	LABORATORY METHOD	

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LESSON PLAN

IIND YEAR GENERAL

NAME: SMT SHARMISTHA BASU

DEPARTMENT: BOTANY

YEAR	PAPER	UNIT	TOPIC	NO. OF LECTURES	SESSION
2018-19	II	MODULE III Cell Biology and Genetics:	2. Cell Biology and Genetics: 2.1 Ultrastructure of nuclear envelope, nucleolus and their functions, 2.2 Molecular organisation of metaphase chromosome (Nucleosome concept), 2.3 Chromosomal aberrationsdeletion, duplication, inversion & translocation, 2.4 Aneuploidy & Polyploidy- types, importance and role in evolution, 2.5 Central Dogma,	4 CHALK AND TALK METHOD, CHARTS	JULY TO PRE-PUJA

	MODULE III	 2.6 DNA replication - mechanism in prokaryote, 2.7 Transcription, Processing of mRNA and Translation, 2.8 Genetic Codeproperties, 2.9 Epistasis, 	4 CHALK AND TALK METHOD, CHARTS	POST-PUJA TO WINTER VACATION
	MODULE III	2.10 Linkage group and Genetic map (three-point test cross), 2.11 Mutation - Point mutation (tautomerisation; transition, transversion and frame shift), Mutagenphysical and chemical, 2.12 Brief concept of Split gene, Transposons.	2 CHALK AND TALK METHOD, CHARTS	POST- WINTER VACATION TO TEST
I	MODULE IV	5. Ecology: 5.1 Ecotypes and microclimate, 5.2 Plant succession - stages of succession (hydrosere)	3 CHALK AND TALK METHOD, CHARTS	JULY TO PRE-PUJA
	MODULE IV	5.3 Ecological adaptation of hydrophytes, halophytes and xerophytes,	2 CHALK AND TALK METHOD, CHARTS	POST-PUJA TO WINTER VACATION
	MODULE IV	5.4 Biodiversity - Definition, levels of biodiversity (genetic, species and ecosystem), methods of <i>in-situ</i> & <i>ex-situ</i> conservation, 5.5 Phytoremediation (brief idea).	2 CHALK AND TALK METHOD, CHARTS	POST- WINTER VACATION TO TEST

		1		
PAPER III (PRACTICAL)	MODULE V PRACTICAL	2. Angiosperms: Dissection, drawing and labeling, description of angiospermic plants and floral parts, floral formula and floral diagram, identificaiton (family) from the following families: Leguminosae (Fabaceae), Malvaceae, Solanaceae, Labiatae (Lamiaceae), Acanthaceae.	12 LABORATORY METHOD	JULY TO PRE-PUJA
	MODULE V	3. Identificaiton with reasons: Cryptogamic specimens (macroscopic/microscopic) as prescribed in the theoretical syllabus. Gymnosperms: Macroscopic - male and female strobilus of <i>Cycas</i> , and <i>Pinus</i> Anatomical slides (stelar types, transfusion tissue, sieve tube, sunken stomata, lenticel). Morphology: Inflorescence types.	6 LABORATORY METHOD	POST-PUJA TO WINTER VACATION
	MODULE V	 Cryptogams: Work out, microscopic preparation, drawing and labeling, description and identification of the following cryptogams: <i>Chara, Ectocarpus,</i> <i>Rhizopus, Ascobolus.</i> Spot identification (Scientific names and familiac) of the 	12	POST- WINTER VACATION TO TEST

		following Angiospermic		
		nlante:	METHOD	
		Cida rhambifalia	METHOD	
		Sida mombilona		
		(Malvaceae), Aduliion		
		i nespesia populnea		
		(Malvaceae), Cassia		
		sophera (Fabaceae),		
		Tephrosia hamiltonii		
		(Fabaceae), <i>Crotalaria</i>		
		pallida	LABORATORY	
		(Fabaceae), <i>Leucaena</i>	METHOD AND	
		leucocephala (Fabaceae),	EXCURSION	
		Coccinia grandis		
		(Cucurbitaceae), Solanum		
		sisymbriifolium		
		(Solanaceae),. Nicotiana		
		plumbaginifolia		
		(Solanaceae), Physalis		
		minima		
		(Solanaceae), Leucas		
		aspera (Lamiaceae).		
		Leonurus sibiricus		
		(Lamiaceae) Anisomeles		
		indica		
		(Lamiaceae) Parthenium		
		bysterophorus		
		(Asteraceae) Triday		
		(Asteraceae), muax		
		Mikania ccandons		
		(Astornassa) Falinta		
		(Asteraceae), Eclipia		
		prostrata (Asteraceae),		
		(Poaceae),		
		Chrysopogon aciculatus		
		(Poaceae), Eleusine indica		
		(Poaceae), Vanda		
		tasellata (Orchidaceae).	-	
PAPER III	MODULE VI	1. Plant Physiology:	9	JULY TO
		i) Experiment on		PRE-PUJA
		Plasmolysis.		
		ii) Measurement of leaf		
		area (graphical method)	METHOD	
		and determination of		
		transpiration rate per unit		
		area by weighing method.		
		iii) Imbibition of water by		
		dry seeds - proteinaceous		
		and fatty seeds.		
		$i_{\rm V}$ Evolution of O2 during	3	
		nhotosynthesis (using	5	
		araduated tube)		VACATION
		g. addied tabej.		

	 v) Evolution of CO2 during aerobic respiration and measurement of volume. 4. Identificaiton with reasons: Cytological slides of different mitotic and meiotic stages. 	3 6 LABORATORY METHOD	
	 3. Cell Biology: i) Staining (Aceto-orcein) and squash preparation of onion root tip: study of mitotic stages. ii) Determination of mitotic index (from onion root tip). 	6 LABORATORY METHOD	POST- WINTER VACATION TO TEST

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IIIrd year General

YEAR	PAPER	UNIT	TOPIC	NO. OF LECTURES	SESSION
	IVA	Module VII	Module VII 1. Biofertilizer: 1.1 Sources 1.2 Production, 1.3 Application.	4 Chalk and talk method, PPT, MULTIMEDIA ANIMATIONS	JULY TO PRE- PUJA
	IVB	Module VIII	Practical Module VIII 1. Acquaintance with laboratory instruments - Autoclave, Incubator, Clinical centrifuge, Analytical balance, pH Meter, Colorimeter, Water bath, Distillation plant. 2. Sterilization technique by autoclaving	Laboratory method 8.	
	IV A	MODULE VII	 Mushroom: 1 Food value, 2.2 Cultivation technique of Pleurotus. Plant disease control: 3.1 Quarantine, 3.2 Biological control, 3.3 Chemical Control. 	6 Chalk and talk method, PPT, MULTIMEDIA ANIMATIONS	POST-PUJA TO WINTER VACATION
	IVB	MODULE VIII	PRACTICAL Preparation of PDA medium (slants, pouring of plates). 4. Bacteria staining by simple staining method (methylene blue/crystal violet) from curd. 6. Determination of Goodness of fit of normal monohybrid ratios (3: I and I: 1) by Chi-square	6 Laboratory method	
	IVA	MODULE VII	4. Plant Breeding: 4.1 Mass and Pure line selection, 4.2	5 Chalk and talk method, PPT,	POST-WINTER VACATION TO TEST

		Heterosis and hybrid seed production	MULTIMEDIA ANIMATIONS	
IV B	MODULE VIII	PRACTICAL 5. Acquaintance with common medicinal plants and their useful parts : Terminalia arjuna, Centella asiatica, Saraca asoca, Adhatoda vasica, Andrographis paniculata, Asteracantha longifolia, Eclipta alba, Aloe barbadensis, Rauvolfia serpentina, Vitex negundo, Herpestis monieria, Holarrhena antidysenterica, Boerhaavia repens.	Laboratory method and field visits.	
		7. Visit to a Medicinal Plant Garden.	Field survey and excursions.	

LESSON PLAN2018-2019

(SEMESTER 1, SEMESTER 2, PART II AND PART III HONOURS AND GENERAL)

NAME : PAYEL CHATTERJEE

DEPARTMENT : BOTANY

SEMESTER 1 HONOURS

YEAR	PAPER	UNIT	TOPIC	NO .0F	SESSION
				LECTURES	
2018-	CORE	THEORY	1. Terms	6	IULY 2018
2010			and Definitions: Disease	U	TO
2019			concept, 1.2. Symptoms,		
	PLANT		1.3. Etiology & causal		DECEMBER
	PATHOLOGY		complex, 1.4. Primary		2018
			and secondary inocula,		
			1.5. Infection, 1.6.		
			Pathogenecity and		
			pathogenesis. 1.7.		
			Necrotroph and		
			Biotroph, 1.8. Koch's		
			Postulates, 1.9. Endemic.		
			Epidemic, Pandemic and		
			Sporadic disease. 1.10.		
			Disease triangle.		
			1.11. Disease cycle		
			(monocyclic, polycyclic		
			and polyetic).		
			2. Host – Parasite	6	
			Interaction:	-	
			Mechanism of		
			infection (Brief idea		
			about Pre-penetration.		
			Penetration and Post-		
			penetration).		
			Pathotoxin		
			(Definition, criteria and		
			example), 2.3. Defense		
			mechanism with special		
			reference to Phytoalexin,		
			2.4. Resistance- Systemic		
			acquired and Induced		
			systemic.		
			3. Plant Disease	Q	
			Management :	0	
			Quarantine, 3.2.		
			Chemical, 3.3. Biological,		
			3.4. Integrated.		
			4. Symptoms ,	10	
			Causal organism, Disease		
			cycle and Control		
			measures of:Late blight		
			of Potato, 4.2. Brown		
			spot of rice, 4.3. Black		
			stem rust of wheat, 4.4.		
			Stem rot of jute.		

	PRACTICAL	1. Preparation o		JULY 2018-
	11010110/12	fungal media (PDA)		
		2 Sterilization		DECEIVIBER
				2018
		process.		
		3. Isolation of		
		pathogen from diseased		
		leaf.		
		4. Inoculation o	:	
		fruit and subculturing.		
		5. Identification		
		Pathological speciment		
		of Brown spot of rice		
		Bacterial blight of rice		
		Loose smut of wheat		
		Stem rot of jute, Late		
		blight of potato; Slides o	:	
		uredial, telial, pycnial 8		
		aecial stages of Puccinia		
		graminis.		

SEMESTER 2

YEAR	PAPER	UNIT	TOPIC	NO .0F	SESSION
				LECTURES	
2018-2019	CORE COURSE	THEORY	1.Cell	8	JANUARY
	3 – PLANT		wall:Ultrastructure		2019 TO
	ANATOMY		& Chemical		JUNE2019
			constituents, 1.2.		
			Plasmodesmata-		
			ultrastructure, 1.3.		
			Concept of		
			Apoplast and		
			Symplast, 1.4.		
			Growth and		
			Thickening of cell		
			wall.		
			2. Stomata: Types	4	
			(Metcalfe and		
			Chalk, Stebbins		
			and Khush).		
			3. Stele:	4	
			3.1 Leaf-trace and		
			leaf-gap, 3.2.		
			Stelar types &		
			evolution		
			6.Mechanical	4	
			tissues and the		
			Principles		
			governing their		
			distribution in		
			plants.		
			9.Scope of plant	4	
			anatomy:		

	i	application in	
	9	systematics,	
	1	forensics and	
	1	pharmacognosy	

SEMESTER 2 GENERAL

YEAR	PAPER	UNIT	TOPIC	NO .0F	SESSION
				LECTURES	
2018-2019	CORE COURSE	THEORY	Angiosperm	12	JANUARY2019
	2		Morphology-		–JUNE2019
	PLANT		Inflorescence		
	DIVERSITY II		types with		
			examples,		
			Flower, Fruits		
			and seeds- type		
			and examples.		
		PRACTICAL	Dissection,		JANUARY2019
			drawing and		TO JUNE2019
			labelling,		
			description of		
			angiospermic		
			plants and floral		
			parts, floral		
			formula and		
			floral diagram,		
			identification		
			(family) from		
			the following		
			families:		
			Leguminosae		
			(Fabaceae),		
			Malvaceae,		
			Solanaceae,		
			Labiatea		
			(Lamiaceae),		
			Acanthaceae.		
			Identification		
			with reasons:		
			Macroscopic		
			specimens of		
			Selaginella and		
			Pteris, male and		
			female strobilus		
			of Cycas and		
			Pinus,		
			Anatomical		
			slides (stellar		

	types,	
	transfusion	
	tissue, sieve	
	tube, sunken	
	stomata,	
	lenticels),	
	inflorescence	
	types.	
	<i>,</i> ,	
	3. Spot	
	identification of	
	the following	
	Angiospermic	
	nlants (scientific	
	names and	
	families): Sida	
	rhomhifolia	
	(Malvaceae)	
	Abutilon	
	indicum	
	(Malvaceae)	
	Cassia sonhera	
	(Fabaceae)	
	Tenhrosia	
	halimtonii	
	(Fabaceae)	
	Crotolaria	
	nalida	
	(Fabaceae)	
	Coccinia grandis	
	(Cucurbitaceae).	
	Solanum	
	indicum	
	(Solanaceae).	
	Nicotiana	
	plumbagenifolia	
	(Solanaceae).	
	Leucas aspera	
	(Lamiaceae).	
	Leonurus	
	sibiricus	
	(Lamiaceae),	
	Parthenium	
	hysterophorus	
	(Asteraceae),	
	Tridax	
	procumbense	
	(Asteraceae),	
	Eclipta	
	prostrate	

	(Asteraceae),	
	Eragrostis	
	tenella	
	(Poaceae),	
	Chrysopogon	
	aciculantus	
	(Poaceae),	
	Eleusine indica	
	(Poaceae),	
	Vanda	
	taesellata	
	(Orchidaceae)	

PART III HONOURS

YEAR	PAPER	UNIT	ΤΟΡΙϹ	NO. OF	SESSION
				LECTURES	
2018-2019	VI	CELL BIOLOGY THEORY	1.Origin and Evolution of Cells :Concept of RNA world, Ribozymes, First cell, 1.2. Origin of eukaryotic cell, 1.3. Organellar DNA (cp-and mt-DNA).	3	JULY TO PRE PUJA
			2.Nucleus and Chromosome :Nuclear envelope , Nuclear lamina and Nuclear pore complex,	4	
		GENETICS & MOLECULAR BIOLOGY	1. Linkage, Crossing over and Gene Mapping : Complete and incomplete linkage, linkage group, 1.2 Detection of crossing over(McClintock's experiment), 1.3 Molecular mechanism of crossing over (Holliday model),	7	

		1.4 Gene mapping (three point test cross), 1.5 Co- efficient of coincidence and interference, Mapping function, 1.6 Problems on gene mapping, 1.7 Molecular mapping – ISH, FISH (brief idea).		
		2. Epistasis and Polygenic inheritance in plants.	1	
		3. <i>Aneuploidy and</i> <i>Polyploidy</i> : Types, examples, meiotic behaviour and importance of: 3.1 Aneuploidy, 3.2 Polyploidy.	3	
	CELL BIOLOGY THEORY	2.2. Nucleolus- ultrastructure and ribosome biogenesis,	2	POST PUJA TO WINTER VACCATION
		2.3. Chromatin ultrastructure and DNA packaging in eukaryotic chromosome,	1	
		2.4. Karyotype concept and its parameters2. Cell cycle and its regulation :	1	
		3.1. Centromere, kinetochore, spindle apparatus & telomere–structural organization and functions,	2	
	GENETICS & MOLECULAR BIOLOGY	4. <i>Chromosomal</i> <i>aberration</i> : Typesand meiotic behaviour of: 4.1 Deletion, 4.2 Duplication, 4.3 Translocation, 4.4Inversion.	3	
		5. Mutation :		

	Point	4	
	mutation-		
	Transition,		
	Transversion and		
	Frame shift		
	mutation, 5.2		
	Molecular		
	mechanism		
	(tautomerisation,		
	alkylation,		
	deamination, base		
	analogue		
	incorporation,		
	dimerisation), 5.3		
	DNA repair (brief		
	idea).		
	6. Structural		
	organisation of		
	Gene		
	:		
	One Gene-one		
	polypeptide		
	concept, 6.2		
	Complementation		
	test (rII locus),		
	6.3 Split gene, 6.4		
	Overlapping		
	gene,		
	6.5 Repetitive	4	
	DNA- tandem		
	and interspersed,		
	6.6 Transposon		
	(Ac-Ds		
	system Homoeotic		
	gene in plants		
	(ABC model in		
	Arabidopsis).		
	7. DNA		
	Replication,	10	
	Transcription and	10	
	Translation		
	(Prokaryotes &		
	Eukaryotes):		
	Central Dogma,		
	1.2		
	Semiconservative		
	replication –		
	mechanism, 7.3		
	Transcription, 7.4		
	KINA processing,		
	/.J		
	Aminoacylation		
	$\begin{array}{ccc} \text{OI} & \text{IKINA,} & \text{I.0} \\ \text{Translation} & \text{C.7} \end{array}$		
	ransiation.), 6./		

	CELL BIOLOGY	Dynamics of chromosome movement in anaphase, Mechanism of cell cycle control in Yeast (checkpoints and role of MPF), Apoptosis (Brief idea).	2	POST WINTER VACCATION TO TEST
	GENETICS & MOLECULAR BIOLOGY	Gene Regulation : Concept of Lac- operon, Positive and negative control. Genetic Code : Properties- evidences & exceptions, Decipherence of codon (Binding	1	
		10. Recombinant DNA Technology: Enzyme (Restriction endonuclease, ligase), Vector (plasmid pBR 322) Marker gene, Steps of cloning technique, PCR and its application 10.6 Genomic DNA and cDNA library.	4	
		11. <i>Bioinformatics</i> : Brief concept on Genomics, 11.2 Proteomics	1	
VIII (PRACTICAL)	CELL BIOLOGY AND GENETICS	1. Introduction to chromosome preparation: Pre- treatment, Fixation,	24	JULY TP PRE PUJA

		Staining, Squash and Smear preparation, Preparation of permanent slides. 2.Determination of mitotic index and frequency of different mitotic stages in pre-fixed root tips of Allium cepa.		
	CELL BIOLOGY AND GENETICS	 3. Study of mitotic chromosome : Metaphase chromosome preparation , free hand drawing under high power objective, drawing with drawing prism under oil immersion lens, determination of 2n number, comment on chromosome morphology of the following specimens from root tips: <i>Aloe vera</i> , <i>Lens</i> <i>esculenta</i>. 4. <i>Study of meiotic</i> <i>chromosome</i>: Smear preparation of meiotic cells, identification of different stages and free hand drawing of the following specimens from flower buds: <i>Allium cepa</i> and <i>Setcreasea</i> sp. 	27 17	POST PUJA TO WINTER VACCATION
	CELL BIOLOGY AND GENETICS	5. Identification from permanent slides : Meiosis – (i) normal stages (ii) abnormal stages – laggard, anaphase bridge,	6	POST WINTER VACCATION TO TEST

ring chromosome (<i>Rhoeo discolor</i>); Mitosis –(i) normal stages, (ii) abnormal stages- early separation, late separation, multipolarity, sticky	
multipolarity, sticky	
fragmentation, (ii)	
pollen mitosis.	

PART II GENERAL

YEAR	PAPER	UNIT	TOPIC	NO. OF	SESSION
				LECTURES	
2018-2019	PAPER III	MODULE V (PRACTICAL)	2. Angiosperms: Dissection, drawing and labeling, description of angiospermic plants and floral parts, floral formula and floral diagram, identificaiton (family) from the following families: Leguminosae (Fabaceae), Malvaceae, Solanaceae, Labiatae (Lamiaceae),	15	JULY TO PRE- PUJA
			Acanthaceae.		
		MODULE V	 3. Identificaiton with reasons: Cryptogamic specimens (macroscopic/microscopic) as prescribed in the theoretical syllabus. Gymnosperms: Macroscopic - male and female strobilus of Cycas, and Pinus Anatomical slides (stelar types, transfusion tissue, sieve tube, sunken stomata, lenticel). Morphology: Inflorescence types. 	3	POST-PUJA TO WINTER VACATION
		MODULE V	1. Cryptogams: Work out, microscopic preparation, drawing and labeling, description and identification of the following cryptogams:	12	POST- WINTER VACATION TO TEST

	Chara, Ectocarpus.		
	Rhizopus. Ascobolus		
	4 Spot identification	6	
	(Scientific names and	0	
	families) of the following		
	Angiosparmic plants: Sida		
	rhombifolia (Malyacaa)		
	Abutilon indicure		
	(Iviaivaceae), Inespesia		
	populnea (Malvaceae),		
	Cassia sophera (Fabaceae),		
	Tephrosia hamiltonii		
	(Fabaceae), Crotalaria		
	pallida		
	(Fabaceae), Leucaena		
	leucocephala (Fabaceae),		
	Coccinia grandis		
	(Cucurbitaceae), Solanum		
	sisymbriifolium		
	(Solanaceae),. Nicotiana		
	plumbaginifolia		
	(Solanaceae), Physalis		
	minima		
	(Solanaceae), Leucas		
	aspera (Lamiaceae),		
	Leonurus sibiricus		
	(Lamiaceae). Anisomeles		
	indica		
	(Lamiaceae) Parthenium		
	hysterophorus		
	(Asteraceae) Triday		
	procumbens (Asteraceao)		
	Mikania coordore		
	(Actornance)		
	(Asteraceae), Eclipta		
	prostrata (Asteraceae),		
	Eragrostis tenella		
	(Poaceae),		
	Chrysopogon aciculatus		
	(Poaceae), Eleusine indica		
	(Poaceae), Vanda tasellata		
	(Orchidaceae).		

LESSON PLAN (SESSION 2018-2019)

NAME: **DR. SUDIP KUMAR SINHA** DESIGNATION: **ASSISTANT PROFESSOR** DEPARTMENT: **BOTANY**

SEMESTER I (HONS.)

YEAR	PAPER	UNIT	ΤΟΡΙϹ	NO. OF LECTURES	SESSION
2018-19	CC2 (PRACTICAL)	CC2 PRACTICAL- RACTICAL) MYCOLOGY	General account of the microscope and staining and semi-permanent preparation of slide.		
			General account of micrometry and standerdization of alloted microscope in both low and high magnification.		AUGUST TO DECEMBER
			Work out of the following fungi with reproductive structures (including microscopic measurement of Reproductive structures): Semi-permanent preparation with cotton blue- lactophenol staining of <i>Rhizopus</i> (asexual), <i>Ascobolus</i> , <i>Agaricus</i> .		
			Study from permanent slides: Zygospore of <i>Rhizopus</i> , Conidia of <i>Fusarium</i> , Conidiophore of <i>Penicillium</i> .		
			Morphological study of Fungi (fruit body of <i>Polyporus</i> , <i>Cyathus</i>), Lichens (fruticose and foliose)		
			One local excursion to be conducted for study and collection of macrofungi.		AUGUST

SEMESTER II (HONS.)

YEAR	PAPER	UNIT	ΤΟΡΙϹ	NO. OF LECTURES	SESSION
			BRYOPHYTES 1. General Account : 1.1. General characteristics and adaptations to land habit, 1.2. Classification (Strotler and Crandle Strotler, 2009) up to class with diagnostic characters and examples.	4	
			2. Life History: Gametophyte structure and Reproduction, Development and Structure of sporophyte, Spore dispersal in: 2.1. <i>Marchantia</i> , 2.2. <i>Anthoceros</i> , 2.3. <i>Funaria.</i>	6	FEBRUARY
2018-19	CC4 (THEORY)	BRYOPHYTES	 3. Phylogeny: 3.1. Unifying features of archaegoniates; transition to land habit, 3.2. Origin of Alternation of Generations (Homologous and Antithetic theory), 3.3. Evolution of Sporophytes (Progressive and Regressive concept), 3.4. Origin of Bryophytes. 	6	TO PRE- SUMMER RECCESS

	 4. Importance : Role of bryophytes in: 4.1. Plant succession, 4.2. Pollution Monitoring, 4.3. Economic importance of bryophytes with special reference to Sphagnum. 	3	
CC4 (PRACTICAL)	Botanical excursion to familiarize the students with the natural habitats of Archaegoniate is organized.		

IInd YEAR HONS.

YEAR	PAPER	UNIT	торіс	NO. OF LECTURES	SESSION
			1. Cell wall: 1.1. Ultrastructure & Chemical onstituents; Definition of cell wall and gross structure of cell wall including primary wall, secondary wall and middle lamella. In ultrastructure, structure of microfibrils and model of ultrastructure. Detail description of chemical constituents, like cellulose, pectin, gum, mucilage, hemicellulose, xylan, protein, lignin, cutin, tannin and wax and their functions.	2	
			1.2. Plasmodesmata- ultrastructure; Ultrastructural model of plasmodesmata with figure and function of plasmodesmata.	1	
			1.3. Concept of Apoplast and Symplast; Brief description and functions of apoplast and symplast.	1	JULY TO PRE-PUJA
			1.4. Growth and Thickening of cell wall; Two different pathways of cell wall growth are described.	1	
			 Stomata : Types (Metcalfe and Chalk, Stebbins and Khush); Structure of stomata and their types; types in dicot and 4 types in monocot with figure and example. Ontogeny; Three types of stomatal development according to Pant, 1965. 	3	
			3. Ontogeny of 3.1. Trachea and 3.2. Sieve- tube; Detail developmental pathway with figure.	1	
2018-19	III (Theor etical)	ANATOMY	 4. Stele : 4.1 Leaf-trace and leaf-gap, Definition and description with figure 4.2. Stelar types & evolution; Definition, types of stele like protostele with subtypes, siphonostele, eustele, atactostele, polystele etc. with proper illustration and example, In steler evolution, expansion theory and invasion theory were described. 	2	

5. Secondary growth: 5.1. Normal (intra- & extra-stelar), Intra and extrasteler secondary growth of dicot stem, secondary growth in dicot root, secondary growth in monocot stem, annual ring.	2	POST-PUJA TO WINTER VACATION
5.2. Anomalous (stem of <i>Bignonia</i> , <i>Boerhavia</i> , <i>Tecoma</i> , <i>Dracaena</i> and root of <i>Tinospora</i>). Different types of anomalous secondary growth, example. Diagrammatic and cellular representation of stem.	4	
6. Mechanical tissues and the Principles governing their distribution in plants. Types of mechanical tissue, principles like inflexibility (concept of I girder), inextensibility, incompressibility and shearing stress.	1	
7. <i>Developmental Anatomy</i> : 7.1. Organisation of shoot apex (Tunica– Corpus) and Root apex (Korper-Kappe), Structure of apical meristem, theories of shoot apical meristem includes; apical cell theory, histogen theory and Tunica–Corpus theory, theories of root apical meristem includes; apical cell theory, histogen theory and Korper-Kappe theory. 7.2. Plastochrone. Basic concept	3	POST- WINTER
8. Ecological Anatomy: Adaptive anatomical features of 8.1.Hydrophytes; Anatomical features of submerged, floating and amphibious plant.	1	TO TEST
8.2. Xerophytes; Anatomical features of xerophytes.	1	

IIIrd YEAR HONS.

YEAR	PAPER	UNIT	торіс	NO. OF LECTURES	SESSION
			 Biochemical Pointations . 1.1. Covalent and non-covalent bonds; hydrogen bond; Van der Waal's forces; Definition and explanation of covalent bond and other interactions. Importance of non- covalent interaction in biological system. 1.2. Structure and properties of water; Structure of water molecule, tetrahedron conformation, hydrogen bond formation in water, properties of water. 1.3. pH and buffer (inorganic and organic); Ionization of water, concept of pH, definition of buffer, mechanism of buffer action, types of buffer. 1.4. Handerson-Hasselbalch equation; Deduction and application. 1.5. Isoelectric point; Definition, deduction and application of isoelectric point. 	5	

			 Molecules of life : Nucleic Acids – structure of nucleosides and nucleotides; Brief introduction and history of discovery, structure of nitrogenous bases and sugars, structure of nucleoside and nucleotides. oligo- and poly nucleotides; Application of oligonucleotides, Watson and Crick model of DNA, B & Z form of DNA; Difference between A,B and Z form of DNA. RNA- different forms; Primary, secondary and tertiary structure of mRNA, rRNA and tRNA and their functions. Nucleotide derivatives (ATP, NADP); Structure and function. 	4	JULY TO PRE-PUJA
			2.2. Proteins – structure and classification of amino acids; General structure and property, classification and essential amino acids. Primary, secondary, tertiary and quaternary structure of proteins; Primary structure of protein, formation of peptide bond, configuration of peptide plane, Ramachandran plot, secondary structure- α-helix, βsheets, loops, super secondary structure- domain and motif, tertiary structure, CATH and SCOP classification, Quaternary structure.	4	
2018-19	V	BIOCHEMISTRY	2.3. Carbonydrates - structure or mono-, di and polysaccharide; Structure, description, types, and example. stereoisomers, enantiomers and epimers; Definition, description and example.	2	
			2.4. Lipids - structure of simple lipid and compound lipid (phospholipids and glycolipids), Types, structure, example, fatty acids- saturated and unsaturated, Types, structure and nomenclature.	2	

	 3.Energy flow and enzymology : 3.1. Bioenergetics-Thermodynamic principles; Laws of thermodynamics, concept of entropy and enthalpy, exergonic and endergonic reactions, free energy; Concept of ΔG. Energy rich bonds- phosphoryl group transfer and ATP; Detail description. Redox potentials and Biological redox reactions, Concept of redox potential, half reaction, Nernst equation. 3.2. Enzymes-classification and nomenclature (IUBMB); 6 types and example, Co-factors and co-enzymes; Definitions and examples isozymes; Definition and examples. 3.3. Mechanism of enzyme action; Two main types of theory regarding mechanism. Enzyme inhibition; Types of enzyme inhibition with example. 3.4. Enzyme kinetics (Michaelis-Menten 	5	POST- PUJA TO WINTER VACATION
	 4. Enzyme kinetics (Michaelis-Menten equation) and simple problems. Basic idea about chemical kinetics, Derivation of Michaelis- Menten equation, Modification. 4.1. Membrane chemistry, Detail structure of the membrane components. 4.2. Membrane transport (uniport, symport, antiport); Diffusion, facilitated diffusion, channels, active transport. mechanism of ion uptake; Brief mechanism. 4.3. Signal transduction pathway and second messenger concept - G-protein and Ca²⁺ as messenger; Detail pathway & G- protein & calcium-calmodulin system. 	4	DOCT
	5. Phosphorylation: ATP Synthesis- Chemiosmotic model, Detail mechanism. Oxidative and Photophosphorylation- Mechanism and differences.	2	POST- WINTER VACATION TO TEST
	 Plant-water relations: Concept of water potential, components of water potential in plant system, Soil-plant-Atmosphere continuum concept, Absorption of water in land plants, Cohesion and adhesion, transpiration pull theory, Cavitation in xylem and embolism, Definition, types, mechanism of formation and removal. Stomatal physiology-mechanism of opening and closing, Role of carbon di oxide, potassium ion, abscisic acid and blue light in stomatal movement, Detail mechanism, Antitranspirants, types and example. 	5	

			2. Organic Translocation :		
			Types and function. 2.2 Phloem loading and unloading, Detail mechanism. 2.3 Mass-flow (pressure flow) hypothesis and its critical evaluation, Concept and evaluation.	4	
			 Photosynthesis : 1 Chemical structure of chlorophyll a and b, Detail structure, absorption and action spectra, Concept, biological significance of carotenoid pigments, Two main functions of carotenoids. 2 Red drop and Emerson effect, Concept, Components of photosystems (light harvesting complex), Description, Photochemical reaction centre, Description, Cyclic and noncyclic electron transport, Differences and description, Water splitting mechanism, Detail mechanism. 3 Calvin cycle–Biochemical reactions & stoichiometry, Pathway reactions with structure. 4 HSK Pathway– three variants of the pathway, Kranz anatomy, pathway with structure. Photosynthetic efficiency of C3 and C4 plants and crop productivity, Comparison. 6. Photorespiration – mechanism and significance, pathway with structure and subcellular localization. 7 Crassulacean acid metabolism – mechanism and ecological significance. Pathway with structure, example, CAM idling. 	8	JULY TO PRE-PUJA
2018-19	V	PLANT PHYSIOLOGY	 4. Respiration : 4.1 EMP pathway, regulation and its anabolic role, Pathway with structure. 4.2 Conversion of Pyruvic acid to AcetylCoA, PDH enzyme complex composition and reaction. 4.3 TCA-cycle and its amphibolic role, 4.4. Oxidative pentose phosphate pathway and its significance, pathway with structure. 4.5 ß-oxidation of fatty acids and significance, pathway with structure. 4.6 Mitochondrial electron transport system, Components uncouplers; examples and functions. 4.7 Oxidation of cytosolic NADH + H+ Three different modes. 4.8 Stoichiometry of glucose oxidation (aerobic). 	6	

	 5. Nitrogen Metabolism : 5.1. Assimilation of nitrate by plants, Biochemical reaction with structure. 5.2. Biochemistry of dinitrogen fixation in Rhizobium, Process of nodule formation, leghemoglobin, reaction of dinitrogen fixation. 5.3. General principle of amino acid biosynthesis (including GS and GOGAT enzyme system), Reaction with structure. 6. Plant Growth Regulators : 6.1. Physiological roles of Auxin, Gibberellin, Cytokinin, Abscisic acid, Ethylene, Detail physiological roles. 6.2. Chemical nature –IAA, GA₃, Kinetin, Chemical structure, synthetic auxin. 6.3. Biosynthesis and bioassay of IAA, Tryptophan dependent and independent pathway of auxin biosynthesis. 6.4 Mode of action of IAA, Acid growth hypothesis, auxin signaling. 6.5. Brassinosteroids and Polyamines as PGRs (brief idea). 	10	POST- PUJA TO WINTER VACATION
	 7. Photomorphogenesis : 7.1 Concept of photomorphogenesis, 7.2 Photoperiodism and plant types, Classification of photoperiodic plants. 7.3 Perception of photoperiodic stimulus, Explanation with experiments. 7.4 Critical day length, concept of light monitoring, 7.5 Phytochrome – chemical nature, interconversion, function in flowering, structure, localization, interconversion, signaling. 7.6 Role of GA in flowering, Mechanism. 7.7 Verbalization – role of low temperature in flowering, Molecular Mechanism of verbalization. 7.8 Concept of biological clock and biorhythm, Brief idea. 8. Seed dormancy: 8.1 Types; Causes and Methods of breaking seed dormancy, Description with examples. 8.2 Biochemistry of seed germination, Role of GA and phytochrome in seed germination. 9. Physiology of Senescence and Ageing. Brief idea. 10. Stress Physiology: Plant responses to: 9.1 Water stress, 9.2 Temperature stress, 9.3 Salt stress Brief idea of all of the above. 	10	POST- WINTER VACATION TO TEST

YEAR	PAPER	UNIT	ТОРІС	NO. OF LECTURES	SESSION
2018-19	VIII	PLANT PHYSIOLOGY BIOCHEMISTRY PRACTICAL	 PLANT PHYSIOLOGY 1. Determination of loss of water per stoma per hour. 2. Relationship between transpiration and evaporation. 3. Rate of photosynthesis under varying HCO⁻³ concentration in an aquatic plant using bicarbonate and to find out the optimum and toxic concentration. 4. Separation of plastidial pigments. 5. Measurement of oxygen uptake by respiring tissue (per g/hr.) 6. Determination of the RQ of germinating seeds. 7. Measurement of osmotic pressure of storage tissue by weighing method. 8. Measurement of osmotic pressure of <i>Rhoeo</i> leaf by plasmolytic method. 9. Effect of temperature on absorption of water by storage tissue and determination of Q₁₀. 10. Comparison of imbibitions of water by starchy, proteinaceous and fatty seeds. 		JULY TO PRE-PUJA
		BIOCHEMISTRY QUANTITATIVE	 Quantitative : 1. Estimation of amino-nitrogen by formol titration method (glycine). 2. Estimation of glucose by Benedict's quantitative reagent. 3. Estimation of titratable acidity from lemon. 4. Estimation of catalase activity in plant samples. 5. Estimation of urease activity in plant samples. 6. Colorimetric estimation of protein by Folin phenol reagent. 		POST- PUJA TO WINTER VACATION
		BIOCHEMISTRY QUALITATIVE	Qualitative : 1. Detection of organic acids: citric, tartaric, oxalic and malic from laboratory samples. 2. Detection of carbohydrate and protein from plant samples. 3. Detection of the nature of carbohydrate- glucose, fructose, sucrose and starch from laboratory sample. 4. Detection of Ca, Mg, Fe, S from plant ash sample.		POST- WINTER VACATION TO TEST

SEMESTER I GENERAL

YEAR	PAPER	UNIT	ΤΟΡΙϹ	NO. OF LECTURES	SESSION
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2018-19	CC1 (THEORETICAL)	BRYOPHYTES	 5.1 Unifying features of archaegoniates and transition to land habit, 5.2 Amphibian nature of bryophytes, 5.3 Diagnostic characters and examples of Hepaticopsida, Anthocerotopsida and Bryopsida (Proskauer 1957), 5.4 Life histories of <i>Marchantia</i> and <i>Funaria</i>, 5.5 Ecological and economic importance. 	12	AUGUST TO PRE-PUJA
		ANATOMY	 6. Anatomy 6.1. Stomata - Types (Metcalfe & Chalk), 6.2. Anatomy of root, stem and leaf of monocots and dicots, 6.3. Stelar types and evolution, 6.4. Secondary growth - normal in dicot stem and anomaly in stem of <i>Tecoma & Dracaena</i>. 	10	POST PUJA TO WINTER VACATION
	CC1 (PRACTICAL)		 Work out: Microscopic preparation, drawing and labeling of <i>Chlamydomonas</i>, <i>Chara</i>, <i>Ectocarpus</i>, <i>Rhizopus</i> and <i>Ascobolus</i>. Anatomical studies (following double staining method) of: 2a. Stem- <i>Cucurbita</i>, sunflower and maize. 2b. Root- <i>Colocassia</i>, gram and orchid. 2c. Leaf- <i>Nerium</i> Identification with reasons: 3a. Cryptogamic specimens (macroscopic/microscopic as prescribed in the theoretical syllabus. Pathological specimens (herbarium sheets) of Late blight of potato, Brown spot of rice and stem rot of jute. 		AUGUST TO WINTER VACATION

IInd YEAR GENERAL

YEAR	PAPER	UNIT	ΤΟΡΙϹ	NO. OF LECTURES	SESSION
	II MODULE IV	BIOCHEMISTRY AND PLANT PHYSIOLOGY	 3.1. Proteins - Primary, secondary and tertiary structure 3.3. Enzyme- Classifications with examples (IUBMB), Mechanism of action. 3.4. Transport in plants - ascent of sap and Xylem cavitation, Phloem transport and source-sink relation, 3.5. Transpiration- Mechanism of stomatal movement, significance 3.6. Photosynthesis- Pigments, Action spectra and Enhancement effect, Electron transport system and Photophosphorylation, C3 and C4 photosynthesis, CAM- Reaction and Significance 	10	AUGUST TO WINTER VACATION

1			1
		i) Experiment on Plasmolysis.	
		ii) Measurement of leaf area (graphical	
		method) and determination of transpiration	
		rate per unit area by weighing method.	
2018-19		iii) Imbibition of water by dry seeds -	
		proteinaceous and fatty seeds.	
		iv) Evolution of O_2 during photosynthesis	
		(using graduated tube).	
		v) Evolution of CO ₂ during aerobic respiration	
		and measurement of volume.	
		2. Anatomy: Anatomical studies (following	ALLOUGT
	III MOCULE VI	double-staining method) of:	
		i) Stem: <i>Cucurbita</i> , Maize.	IOTEST
		ii) Root: Gram, Orchid.	
		iii) Leaf: <i>Nerium</i> , Tuberose.	
		3. Cell Biology:	
		i) Staining (Aceto-orcein) and squash	
		preparation of onion root tip: study of mitotic	
		stages.	
		ii) Determination of mitotic index (from onion	
		root tip).	
		4. Identification with reasons:	
		I) Cytological slides of different mitotic and	
		meiotic stages.	

IIIrd YEAR GENERAL

YEAR	PAPER	UNIT	торіс	NO. OF LECTURES	SESSION
2018-19			 7. Recombinant DNA Technology: 7.1 Recombinant DNA, restriction enzymes, plasmids as vector, 7.2 Gene cloning (basic steps), 7.3 Transgenic plants. 	7	JULY TO PRE- PUJA
	IV A	A MODULE VII	 8. Pharmacognosy: 8.1 Scope and importance, 8.2 Secondary metabolites- alkaloids, terpenoids, phenolics and their functions. 	5	POST- PUJA TO WINTER VACATION
			8.3 Organoleptic evaluation of crude drugs.	2	POST- WINTER VACATION TO TEST