KANNUR UNIVERSITY
(Abstract)

BSc Botany / Plant Science- Revised Scheme, Syllabi & Model Question Papers of Core, Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme-implemented with effect from ***2014 admission-Orders Issued.***

ACADEMIC BRANCH

No. Acad/C2/4075/2014 **Dated, Civil Station P.O, 14- 05-2014**

Read: 1.U.O No. Acad/C2/2232/2014 dated 14-03-2014
2. Minutes of the meeting of the Board of Studies in Botany (UG) held on 03-01-2014.
3. Minutes of the meeting of the Faculty of Science held on 25-03-2014
4. Letter dated 21-04-2014 from the Chairperson, BOS in Botany (UG).

ORDER

1. The Revised Regulations for UG Programmes under Choice based Credit Semester System were implemented in this University with effect from 2014 admission as per paper read (1) above

2. As per paper read (2) above the Board of Studies in Botany finalized the Scheme , Syllabi & model Question Papers for Core, Complementary & open courses of BSc Botany/plant science programmes to be implemented with effect from 2014 admission..

3. As per read (3) above the Faculty of Science held on 25-03-2014 approved Scheme, syllabi & model question papers for core/complementary open courses of BSc Botany/Plant science programmes to be implemented with effect from 2014 admission.

4. The Chaiperson, BOS in Botany (UG) vide paper read (4) above has submitted the finalized copy of Scheme, syllabi & Model question papers for core/complementary and open courses of BSc Botany/plant science programmes for implementation with effect from 2014 admission.

5. The Vice Chancellor, after examining the matter in detail, and in exercise of the powers of the Academic Council as per section 11(1) of Kannur University Act 1996 and all other enabling provisions read together with, has accorded sanction to implement the Revised scheme, syllabi& model question papers of BSc Botany / Plant Science Programmes with effect from 2014 admission.

6. Orders, are therefore issued implementing the revised scheme, syllabi & model question papers for core, complementary& open courses of BSc Botany/plant science programmes under CBCSS with effect from 2014 admission subject to report to Academic Council

7. Implemented revised Syllabi are appended.

Sd/-
DEPUTY REGISTRAR (ACADEMIC)
FOR REGISTRAR

To:

1. The Principals of Affiliated Colleges offering B.Sc Botany/Plant Science Programmes
2. The Examination Branch (through PA to CE)

Copy To:

1. The Chairperson, BOS Botany (UG)
2. PS to VC/PA to PVC/PA to Registrar .
3. DR/AR Academic
4. Central Library
5. SF/DF/FC.

Forwarded/By Order

Section Officer

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KANNUR UNIVERSITY

PROGRAMME STRUCTURE
SYLLABUS AND
SCHEME OF EXAMINATION

FOR

UNDERGRADUATE PROGRAMME

IN

PL ANT SCIENCE (LRP)

CHOICE BASED CREDIT SEMESTER SYSTEM

WITH EFFECT FROM2014 ADMISSION

PROGRAMME STRUCTURE B.Sc PLANT SCIENCE

SEMESTER-1

No	Title of the Course	Hours/week	Hours/sem	Credits	Exam hrs.
1.	Common Course English -1	5	90	4	3
2.	Common Course English -11	4	72	3	3
3.	Additional Language -1	4	72	4	3
4.	Complementary -1 Course-1	2+2	72	2	3
5.	Complementary -11 Course-11	2+2	72	2	3
6.	Enviornmental Science And Phytogeography	2+2	72	3	3
		25	450		

SEMESTER-11

No	Title of the Course	Hours/week	Hours/sem	Credits	Exam hrs.
1.	Common Course English -111	5	90	4	3
2.	Common Course English -1V	4	72	3	3
3.	Additional Language -11	4	72	4	3
4.	Complementary-1 Course -11	2+2	72	2	3
5.	Complementary-11 Course -11	2+2	72	2	3
6.	Angiosperm Anatomy And Microtechnique	2+2	72	3	3
		25	450		

III SEMESTER

No	Title of the Course	Hours/week	Hours/sem	Credits	Exam hrs.
1.	Phycology, Mycology Lichenology	3+2	90	3	3
2.	Plantation Science	3+2	90	3	3
3.	Horticulture	3+2	90	3	3
4.	Complementary-1 Course -111	3+2	90	2	3
5.	Complementary-11 Course-111	3+2	90	2	3
6.		25	450		

1V SEMESTER

No	Title of the Course	Hours/week	Hours/sem	Credits	Exam hrs.
1.	Bryology, Pteridology, Gymnosperms And Paleobotany	3+2	90	3	3
2.	HerbaL Science	3+2	90	3	3
3.	Plantation Management	3+2	90	3	3
4.	Complementary- 1 Course- IV Complementary – 1 Practical	3+2	90	2 4	
5.	Complementary-11 Course -1V Complementary – 11 Practical	3+2	90	2 4	3
6.	Core Practical -1			4	
7.	General Practical- 1			4	
		25	450		

V SEMESTER

No	Title of the Course	Hours/week	Hours/sem	Credits	Exam hrs.
1.	Taxonomy, Morphology And Economic Botany	2+4	36+72	4	3
2.	Microbiology And Plant Pathology	4+2	72+36	4	3
3.	Plant Physiology And Biochemistry	4+3	72+54	4	3
4.	Bioinformatics, Instrumentation And Research Methodology	3+1	54+18	3	3
5.	Open Course	2	36	2	2
		25	450		

VI SEMESTER

No	Title of the Course	Hours/week	Hours/sem	Credits	Exam hrs.
1.	Plant tissue Culture, Embryology And Palynology	3+3	54+54	3	3
2.	Genetics, Biostatitics And Evolution	4+3	72+54	4	3
3.	Biotechnology And Crop Improvement	4+1	72+18	4	3
4.	Cell And Molecular Biology	4=1	72+18	4	3
5.	Core Practical - II			4	
6.	Core Practical - III			4	
7.	Project	2	36	2	
8.	Herbarium+Tour Report				
9.	Practical Record				
		25	450		

Credit, Mark and Hour distribution for B. Sc. PLANT SCIENCE (CORE)

Semester	Course Code	Title	Marks			Credit	Theory	Practical
			Internal	External	Total		hrs/wk	hrs/wk
I	**1B01BOT/PLS**	**Environmental Science and Phytogeography**	**10**	40	**50**	3	2	2
II	**2B02BOT/PLS**	**Angiosperm Anatomy and Microtechnique**	**10**	40	**50**	3	2	2
III	**3B03BOT/PLS**	**Phycology, Mycology and Lichenology**	**10**	40	**50**	3	3	2
	3A11PLS	**PLANTATION SCIENCE**	**8**	32	**40**	3	3	2
	3A12PLS	HORTICULTURE	8	32	**40**	3	3	2
IV	**4B04BOT/PLS**	Bryology, Pteridology, Gymnosperms and Paleobotany	10	40	**50**	3	3	2
	4A13PLS	HERBAL SCIENCE	8	32	**40**	3	3	2
	4A14PLS	PLANTATION MANAGEMENT	8	32	**40**	3	3	2
	4B05BOT/PLS	CORE PRACTICAL - I	15	60	**75**	4		
		Practical Record		5	**5**			
	4A15PLS	GENERAL PRACTICAL - I	8	30	**38**	4		
		Practical Record	0	2	**2**			
V	**5B06BOT/PLS**	Taxonomy, Morphology and Economic botany	10	40	**50**	4	2	4
	5B07BOT/PLS	Microbiology and Plant Pathology	10	40	**50**	4	4	2
	5B08BOT/PLS	Plant Physiology and Biochemistry	10	40	**50**	4	4	3
	5B09BOT/PLS	Bioinformatics, Instrumentation and Research Methodology	10	40	**50**	3	3	1
		Open Course	5	20	**25**	2	2	0
VI	**6B10BOT/PLS**	Plant Tissue culture, Embryology and Palynology	10	40	**50**	3	3	3
	6B11BOT/PLS	Genetics, Biostatitics and Evolution	10	40	**50**	4	4	3
	6B12BOT/PLS	Biotechnology and Crop improvement	10	40	**50**	4	4	1
	6B13BOT/PLS	Cell and Molecular Biology	10	40	**50**	4	4	1
	6B14BOT/PLS	CORE PRACTICAL - II	15	60	**75**	4		
	6B15BOT/PLS	CORE RACTICAL - III	15	60	**75**	4		
	6B16BOT/PLS	Project	5	20	**25**	2	0	2
		Herbarium+Tour report	0	10	**10**	0		
		Practical Record	0	10	**10**	0		
TOTAL			**215**	**885**	**1100**	**74**		

Credit, Mark and Hour distribution for BOTANY (Complementary)

Semester	Course Code	Title	Marks			Credit	Theory	Practical
			Internal	External	Total		hrs/wk	hrs/wk
I	**1C01BOT/PLS**	Diversity of Life-Microbes & Thallophytes	8	32	**40**	2	2	2
II	**2C02BOT/PLS**	Archaegoniatae, Palaeobotany and Reproduction in Angiosperms	8	32	**40**	2	2	2
III	**3C03BOT/PLS**	Angiosperms–Morphology, Systematics, Utility, Plant Breeding and Plant Pathology	8	32	**40**	2	3	2
IV	**4C04BOT/PLS**	Angiosperm - Anatomy and Physiology	8	32	**40**	2	3	2
	4C05BOT/PLS	Practical Paper - I	8	30	**40**	4		
		Record	0	2				
TOTAL			40	160	**200**	12		

Credit, Mark and Hour distribution for BOTANY (Open)

Semester	Course Code	Title	Marks			Credit	Theory
			Internal	External	Total		hrs/wk
I	**5D01BOT/PLS**	Mushroom Cultivation and Marketing	5	20	**25**	2	2
II	**5D02BOT/PLS**	Medicinal Plants	5	20	**25**	2	2
III	**5D03BOT/PLS**	Environmental Science	5	20	**25**	2	2

General Scheme for UG Plant Science				
Semester	Course Code	Title	**Credit**	**Hours/week**
I	**1B01OT/PLS**	Environmental Science and Phytogeography	3	2+2
II	**2B02BOT/PLS**	Angiosperm Anatomy and Microtechnique	3	2+2
III	**3B03BOT/PLS**	Phycology, Mycology and Lichenology	3	3+2
	3A11PLS	Plantation Science	3	3+2
	3A12PLS	Horticulture	3	3+2
IV	**4B04BOT/PLS**	Bryology, Pteridology, Gymnosperms and Paleobotany	3	3+2
	4A13PLS	Herbal Science	3	3+2
	4A14PLS	Plantation Management	3	3+2
	4B05BOT/PLS	Core Practical – I Practical Record	**4**	
	4A15PLS	General Practical -1 Practical Record	4	
V	**5B06BOT/PLS**	Taxonomy, Morphology and Economic botany	4	2+4
	5B07BOT/PLS	Microbiology and Plant Pathology	4	4+2
	5B08BOT/PLS	Plant Physiology and Biochemistry	4	4+3
	5B09BOT/PLS	Bioinformatics, Instrumentation and Research Methodology	3	3+1
V		Open Course	2	2
VI	**6B10BOT/PLS**	Plant Tissue culture, Embryology and Palynology	3	3+3
	6B11BOT/PLS	Genetics, Biostatitics and Evolution	4	4+3
	6B12BOT/PLS	Biotechnology and Crop improvement	4	4+1
	6B13BOT/PLS	Cell and Molecular Biology	4	4+1
VI	**6B14BOT/PLS**	Core Practical - II	**4**	
	6B15BOT/PLS **6B16BOT/PLS**	Core Practical – III Project	**4** **2**	2
VI		Herbarium+Tour report		
VI		Practical Record		
		TOTAL		

Credit, Mark and Hour distribution for BOTANY (Complementary)				
Semester	Course Code	Title	Credit	Hours/week
I	**1C01BOT/PLS**	Diversity of Life-Microbes & Thallophytes	2	2+2
II	**2C02BOT/PLS**	Archaegoniatae, Palaeobotany And Reproduction In Angiosperms	2	2+2
III	**3C03BOT/PLS**	Angiosperms–Morphology, Systematics, Utility, Plant Breeding And Plant pathology	2	3+2
IV	**4C04BOT/PLS**	Angiosperm - Anatomy And Physiology	2	3+2
	4C05BOT/PLS	Core Practical - I	4	
		Record		
OPEN COURSE				
Semester	**Course Code**	**Title**		
I	**5D01BOT/PLS**	Mushroom Cultivation And Marketing	2	2
II	**5D02BOT/PLS**	Medicinal Plants	2	2
III	**5D03BOT/PLS**	Environmental Science	2	2

Scheme of marks distribution (BSc. Plant Science)

Courses		No. of Courses	Marks per course			Total Marks
			Int.	Ext.	Total (Int+Ext)	
Common	English	4	10	40	50	200
	Addl.Language	2	10	40	50	100
	General	4	08	32	40	160
		1	08	32	40	40
Complementary	I	5	08	32	40	200
	II	5	08	32	40	200
Core	Theory	12	10	40	50	600
	Practical	3	15	60	75	225
	Project	-	05	20	25	25
	Record	-	-	15	15	15
	Herbarium +Tour Report	-	-	10	10	10
Open course		1	5	20	25	25
Total						1800

Credit distribution for Plant Science

Subject	Sem	Common Course		Gen.	Core	Complementary		Open	Total
		English	Addl.Lang.			Chmistry	Botany		
Plant Science	I	4+3	4		3	2	2		18
	II	4+3	4		3	2	2		18
	III			3+3	3	2	2		13
	IV			3+3+4	3+4	2+4	2+4		29
	V				4+4+4+3			2	17
	VI				3+4+4+4+4+4+2				25
		14	8	16	56	12	12	2	120

Course Evaluation:

The evaluation scheme for each course shall contain two parts

a) Internal Assessment (IA)

b) External evaluation (End Semester Evaluation ESE)

20% weight shall be given to the internal evaluation. The remaining 80% weight shall be for the external evaluation.

Internal Assessment:

a. 20% of the total marks in each course are for internal assessment. The marks secured for internal assessment only need be sent to university by the colleges concerned.

b. The internal assessment shall be based on a predetermined transparent system involving written test, assignments/ seminars/ Viva and attendance in respect of theory courses and lab involvement and records, tests and attendance in respect of practical courses.

c. Components with percentage of marks of Internal Evaluation of Theory Courses are-

Attendance 25%, Assignment/ Seminar/Viva 25 % and Test paper 50% For practical courses- Attendance 25 %, lab involvement and Record 50% and test 25 % as far as internal is concerned.

Attendance of each course will be evaluated as below-

Above 90% attendance -	100% marks allotted for attendance
85 to 89%	80%
80 to 84 %	60%
76 to 79 %	40%
75 %	20%

7 point indirect grading for U.G.

Seven Point Indirect Grading System Table-1

% of Marks	Grade	Interpretation	Grade point Average (G)	Range of grade points	Class
90 and above	A+	Outstanding	6	5.5 -6	First class with Distinction
80 to below90	A	Excellent	5	4.5 -5.49	
70 to below80	B	Very good	4	3.5 -4.49	First class
60 to below 70	C	Good	3	2.5 -3.49	
50 To below 60	D	Satisfactory	2	1.5 -2.49	Second class
40 to below50	E	Pass/Adequate	1	0.5 -1.49	Pass
Below 40	F	Failure	0	0 - 0.49	Fail

7-Point Indirect grading for U.G.

% of Marks	Grade		Grade point (GPA)	Range of grade points
90 and above	A+	Outstanding	6	5.5 -6
80 to 89	A	Excellent	5	4.5 - 5.49
70 to 79	B	Very good	4	3.5 -4.49
60 to 69	C	Good	3	2.5– 3.49
50 to 59	D	Satisfactory	2	1.5 – 2.49
40 to 49	E	Adequate	1	0.5 – 1.49
Below 40	F	Failure	0	0 - 0.49

Project evaluation

shall be conducted at the end of **sixth semester**. 20 % of marks are awarded through internal assessment. (See section 9.7 and Annexure I)

Every student of a UG Programme shall have to work on a project of two credits under the supervision of a faculty member as per the curriculum. Project evaluation shall be conducted at the end of sixth semester. Projects shall be submitted in the last week of February in VI th semester.

Guidelines for the Evaluation of Projects

1. PROJECT EVALUATION

1. Evaluation **Mark System.**

2.two stages:

a) Internal Assessment (supervising teachers will assess the project and award internal Marks)

b) External evaluation (external examiner appointed by the University)

c) Marks secured for the project will be awarded to candidates, combining the internal and external Marks

3. The internal to external components is to be taken in the ratio

Internal(20% of total)			**External(80% of Total)**	
Components	**% of internalMarks**		**Components**	**% of external Marks**
Punctuality	**20**		**Relevance of the Topic,** **Statement of Objectives,** **Methodology** **(Reference/ Bibliography)**	**20**

Use of Data	**20**		**Presentation,** **Quality of Analysis/Use of Statistical tools,** **Findings and recommendations**	**30**
Scheme/Organization of Report	**30**		**Viva-Voce**	**50**
Viva-Voce	**30**			

4. External Examiners will be appointed by the University from the list of VI semester Board of Examiners in consultation with the Chairperson of the Board.

5. The chairman of the VI semester examination should form and coordinate the evaluation teams and their work.

6. Internal Assessment should be completed 2 weeks before the last working day of VIth semester.

7. Internal Assessment marks should be published in the department.

8. In the case of courses with practical exam, project evaluation shall be done along with practical exams.

9. Chairman Board of Examinations, may at his discretion, on urgent requirements, make certain exception in the guidelines for the smooth conduct of the evaluation of project.

Improvement:

A maximum of three courses (Common, Core, Complementary or Open) can be improved in each semester. Improvement of a particular semester can be done only once. The student shall avail the improvement chance in the succeeding year along with subsequent batch. There shall be no improvement chance for internal evaluation. The internal marks already obtained will be carried forward to determine the new grade/mark in the improvement examination. If the candidate fails to appear for the improvement examination after registration, or if there is no change in the results of the improvement examination, the mark/grade obtained in the first appearance will be retained.

CORE COURSE -Theory I

ENVIRONMENTAL SCIENCE AND PHYTOGEOGRAPHY

COURSE CODE-1B01BOT/PLS

No. of credits-3 **Total Hours- 36**

2 hrs/Wk

Module-1- Ecosystem **8 Hrs**

Introduction-Basic principles and concepts of ecology and environment-Divisions of ecology - Scope and relevance to society and human environment. Need for public awareness. Definition-concept of an ecosystem –Components of ecosystem- **Abiotic factors**: Climatic factors and Edaphic factors. **Biotic factors**. Dynamics of Ecosystem**.** Energy flow in an ecosystem, food chain. Food web and ecological pyramids. Biogeochemical cycle: Gaseous- Carbon & Nitrogen. Hydrological- Water; Sedimentary - Phosphorous . Stability control-Homeostasis.

Module 2- Community Ecology **6Hrs**

Community ecology - concepts, ecads, ecotypes, ecospecies-ecosystem level .Ecological niche- spatial and trophic. Ecological indicators. Community characteristics-Species diversity, dominance, co-existence, structure and interdependence. Ecological Succession-. Hydrosere and Lithosere. Ecological adaptation of Hydrophytes, Xerophytes, Halophytes and parasites.

Module 3 - Natural Resources And Management **8 Hrs**

Definition, types - Renewable and non-renewable .Natural resources and associated problems- Depletion – natural and anthropogenic causes;- overpopulation, urbanization, overuse, land degradation, man- induced land slides, soil erosion and desertification, deforestation, overgrazing, mining, pesticide and fertilizer use etc.

a) Land –forest, minerals and food. Chipko movement, Social forestry and agroforestry.

b) Water –Rain water harvesting and watershed management.

c) Energy resources: Renewable and non-renewable resources, use of alternate energy sources.

Module 4- Pollution **8Hrs**

Environmental pollution - Definition, causes-effects (Biological and Environmental) and control measures of -Air, Water, radioactive, noise and thermal pollution. Climate change and Global warming, acid rain, ozone layer depletion, and nuclear accidents . Phytoremediation. Role of an individual in prevention of pollution. Pollution case studies(Endosulphan, Bhopal gas tragedy). Sustainable development- sustainable life style,3R'S and public awareness. World Earth summits – Rio and Kyoto.

Module 5-Biodiversity and its Conservation **4 Hrs**

Biodiversity- Concepts of biodiversity -Types of biodiversity- India as mega diversity nation- hotspots of biodiversity-Western ghats. Major threats to biodiversity, red data book. Conservation of biodiversity - National parks, wildlife sanctuaries and biosphere reserves.

Module 6-Phytogeography **2hrs**

Phytogeography- Definition, concepts --Descriptive and dynamic -Continental drift, age and area theory, Endemism, centre of origin, Plant migration and barrier .Topographic factors- Altitude and latitude. GPS. Remote sensing. Vegetation types of India.

References

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2. Agarwal K .C . – *Envoronmental Biology* – Nidi Pub:

3. Bharucha, E. 2005. *Textbook of Environmental Studies for Undergraduate Courses*. Universities Press (India) Private Limited, Hyderabad.
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8. Kothari, A. 1997. *Understanding Biodiversity: Life, Sustainability and Equity: Tracts for the Times*. *11*. Orient Longman Ltd., New Delhi.
9. Kumar, H. D .– *Modern concept of Ecology* – Vikas Pub:
10. Kumaresan B. – *Plant Ecology & Phytogeography* – Rastrogi Pub:
11.R.S.Ambasht,N.K. Ambasht- Textbook of Plant Ecology ,15TH edition CBS publishers and distributors, Delhi.

PRACTICALS **Total Hours-36 Hrs**

2hrs/Wk

1. Visit a local polluted site and documentation of major pollutants/Reserve forest.
2. Study of plant community by quadrat method.
3. Study of ecological and anatomical modification of xerophyte, hydrophyte and epiphyte.
4. Estimation of DO and BOD and calculate the primary productivity.
5. Estimation of dissolved carbon dioxide in water
6. Knowledge of ecological instruments- hygrometer, rain gauge, anemometer, altimeter, luxmeter, wet and dry bulb thermometer, salinometer, water sampler, GPS (with the help of equipment/digram or photograph)

Reg. No.:……

Name:……

I Semester B.Sc. Degree Examinations.
BOTANY (Core)
CORE COURSE - I
COURSE CODE - 1B01BOT/PLS – ENVIRONMENTAL SCIENCE & PHYTOGEOGRAPHY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. An Ecofriendly fuel
   a) Petrol b) CNG c) LPG d) none
2. Kyoto Protocol was in
   a)1972 b) 1995 c) 1997 d) 2002
3. Which of the following is a parasite
   a) Achyranthus b) vanda c) Loranthus d) Gnetum
4. Which of the following is a cause for Bhopal gas tragedy
   a) Ethyl cyanateb) Methyl isocyanide c) Methyl mercury d) Arsenic oxide

4x1=4

Section B *(Answer any Eight)*

5. Define Ecological succession? Mention its types ..
6. State major threats of ozone layer depletion..
7. What is Phytoremediation?
8. Why India is considered as Megadiversity nation?
9. How global warming related with climate change.
10. Give notes on Rio protocol.
11. What are the difference between national parks and sanctuaries...
12. Differentiate food chain and food web with examples..
13. What are ecological pyramids.
14. Write short note on Chipko movement.
15. Explain rain water harvesting systems of India.
16. Describe renewable sources of energy.

8x2=16

Section C *(Answer any four)*

17. Explain ecological indicators..
18. How are plants adapted to the desert ecosystem?
19. Why we need conservation? Discuss briefly about the methods of biological conservation
20. Explain various causes for biodiversity loss.
21. Explain any two causes for the depletion of natural resources.
22. Write short note on community characteristics.

4x3=12

Section D *(Answer any One)*

23. With the help of diagram explain nitrogen cycle and carbon cycle. Add a notes on its significance.
24. Discuss the causes ,effects and control measures of water pollution.
25. Define an ecosystem? Describe its components with special reference to forest ecosystem.

1x8=8

CORE COURSE – Theory II

ANGIOSPERM ANATOMY AND MICROTECHNIQUE

COURSE CODE-2B02BOT/PLS

No. of credits-3 **Total Hours- 36**
2 hrs/Wk

Module 1- Cell inclusions **2 hrs**

Introduction, objective and scope of plant anatomy. General structure of higher plant's cell. Non living inclusions – Cystolith, Raphides; Aleurone grains. Starch grains – Eccentric, concentric and compound.

Module 2- Tissues **10 Hrs**

The tissues—meristems-classification-characteristics -meristems and growth of the plant body- root apex-dicot, monocot- vegetative shoot apex-theories- floral apex-. Mature tissues – Definitions, Classification – simple, complex and spécial tissues – secretory cells.

Module 3 -Structure of plant body **15 hours**

Primary vegetative body of the plant-stem – ontogenic development –arrangemenoprimary tissues in the root, stem and leaves (Dicots and Monocots)-Secondary structure – general development-structure of vascular cambium-unusual secondary growth- *Bignonia*, *Boerhaavia*, *Dracaena*.-Nodal anatomy, Floral anatomy, Abscission of leaf. . Wood identification. Ecological anatomy – Hydrophytes, Xerophytes and Halophyte.

Module 4-Microtecqnique **9 hrs**

Preparation of specimens – Whole mounts, Maceration, Smear and squash preparation. Killing and fixing agents- Carnoy's formula, Farmer's formula and F.A.A. Dehydration – reagents-.Sectioning-hand and microtome- rotary and sledge. Staining techniques- single staining, vital staining, double staining. Common stains- saffranin, haematoxylin, acetocarmine.-Mounting media- D.P.X. and Canada balsam.

References

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2. Coutler E. G. (1969) *Plant Anatomy – Part I Cells and Tissues* – Edward Arnold, London.
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5. Maheswari , P. - *Embryology of Angiosperms* - Vikas Pub:
6. Nair P .K .K - *Pollen Morphology of Angiosperms* - Scholar Publishing House, Lucknow
7. Pandey, B. P.(1997) - *Plant Anatomy* - S.Chand and co. New Delhi
8. Saxena M. R. – *Palynology – A treatise* - Oxford & I. B .H., New Delhi.
9. Vashishta .P.C (1984) - *Plant Anatomy* – Pradeep Publications – Jalandhar
9. Prasad and Prasad (1972) *Outlines of Botanical Micro technique*, Emkay publishers, New Delhi
10. Raven, PH; Johnson, GB; Losos, JB; Singer, SR (2005), *Biology, seventh edition*, Tata McGraw-Hill, New Delhi
11. Sass, J .E (1965). *Botanical Micro technique*

PRACTICALS **Total Hours-36 Hrs**
2hrs/Wk

1. Non living inclusions – Cystolith, Raphides, Aleurone grains; Starch grains –Eccentric, concentric, compound
2. Apical meristem – Root apex and stem apex.
3. Simple permanent tissues – Parenchyma, Chlorenchyma, Aerenchyma, Collenchyma and Sclerenchyma.
4. Secretory tissues – Resin canal, Nectory, Laticifers – articulated and non-articulated Latex vessels.
5. Lysegenous and schizogenous cavities.
6. Epidermal structures – Trichomes, Glands, Stomata.
7. Primary structure – Dicot stem – *Hydrocotyle, Cephalandra, Eupatorium* or any dicot stem; Monocot stem – Bamboo, Grass, *Asparagus* or any monocot stem; Dicot root – *Tinospora*, *Ficus*, Pea; Monocot root – *Colocasia, Hedychium, Pandanus* or any monocot root.
8. Secondary structure – Stem (Normal type) – *Tinospora, Vernonia* or any other normal type; Root (Normal type) – *Tinospora, Ficus, Carica papaya*, *Ricinus* or any other normal type.
9. Anomalous secondary thickening – *Bignonia, Boerhaavia*.
10. Leaf Anatomy – Dicot leaf: *Ixora*; Monocot leaf: Grass

Microtechnique
1. Photomicrography and camera lucida drawings.
2. General awareness of Micro technique - maceration, smears & squash.
3. Microtome sectioning and hand sectioning.
4. Preparation of permanent slides.

Reg. No.:……

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II Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE-2B02BOT/PLS - ANGIOSPERM ANATOMY AND MICROTECHNIQUE

Time: 3 Hours **Total Marks: 40**

Section-A (Answer *All*)

1. The reserve material present in aleurone grain is
   a) starch b) protein c) lipids d) water
2. The type of vascular bundle present in Dracaena is
   a) Concentric b) radial c) collateral d) bicollateral
3. Digestive glands are present in
   a) Papaya b) Ocimum c) Nepenthus d) Euphorbia
4. Canada balsm is obtained from
   a) *Cedrus deodara* b) *Araucaria araucana* c) *Pinus roxburhii* d) *Abies balsamea*

1x4=4

Section-B (Answer Any *Four*)

5. Define tissue system
6. Describe the structure of starch grains
7. Explain the process involved in growth of cell wall
8. Give an account of pit.
9. Describe the structure of node.
10. Describe the process of abscission of leaf.
11. What is Vital Staining?
12. What is whole mount? Explain the method of preparation.
13. Explain the formula of Carnoy's fluid
14. Describe the structure and function of Parenchyma
15. What is annual ring. How it is formed.
16. Explain the structure of Dracaena stem

8x2=16

Section-C (Answer Any *Four*)

17. Explain the internal structure of dorsiventral leaf
18. Describe the anomaly and structure of *Boerhaavia* stem.
19. Describe the theories regarding the organization of root apex
20. What is Maceration? Explain the process involved.
21. What is fixing? Name the reagents used.
22. Explain the anatomy of dicot root

4x3=12

Section-D (Answer Any *One*)

23. Give an account of various theories regarding shoot apex organization
24. What is double staining Explain the procedure for the preparation of a permanent slide
25. Describe the anatomical adaptations of hydrophytes and xerophytes

1x8=8

CORE COURSE – Theory III
PHYCOLOGY, MYCOLOGY AND LICHENOLOGY
COURSE CODE-3B03BOT/PLS

No. of credits-3 **Total Hours- 54**
3 hrs/Wk

Module-1Phycology **25 hrs**

Algae- introduction – habitats, thallus organization, ultra structure of cell, pigmentation, evolutionary trends. Classification by Fritsch, economic importance with special reference to soil fertility, commercial products, food and medicine, harmful role - general characteristics, structure, reproduction and life cycle of the following groups –Chlorophyceae – *chlamydomonas, Volvox, Ulothrix, Cladophora, Zygnema, Oedogonium* and *Chara*. Xanthophyceae – *Vaucheria*; Bacillariophyceae – *Pinnularia*; Phaeophyceae- *Sargassum*; Rhodophyceae- *Polysiphonia.*

Module 4- Mycology **25 hrs**

Fungi-general characters and classification (Alexopaulose *et al.* (1996)-habit and habitats mechanism of nutrition- heterothallism and life cycle- cell structure, specialized mycelia structures, reproduction Economic importance- general characters and lifecycle of the following groups: Mastigomycota, Zygomycota, Ascomycota, Basidiomycota, Mitosporic fungi (Asexual fungi or fungi imperfecti). Plant-Fungi associations, Mycotoxins and Secondary metabolites in fungi. *Pythium, Rhizopus, Saccharomyces, Penicillium, Peziza, Puccinia, Agaricus, Cercospora.*

Module 6- Lichenology **4 hrs**

Lichens - nature of association- general characters of habit and habitats, thallus, cell, mechanism of nutrition, reproduction and life cycle. Economic and ecological importance. Structure, properties and reproduction of *Usnea*.

References

1. Dube H C, An Introduction to fungi - Vikas publishing House, New Delhi.
2. Fritsch F E : Structure and reproduction of Algae Vol I and II, Cambridge University Press, London
3. Kumar H. D and Singh A.N. A Text Book on Algae
4. Pandey, B. P. 2001.*College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses,*
5. *Plant Pathology, Industrial Microbiology and Bryophyta*. S. Chand & Company Ltd, New Delhi.
6. Prithipalsingh (2007), An introduction to Biodiversity- Ane Books India, New Delhi
7. Sharma O.P: A Text Book of Algae. Tata Mc. Graw Hill
8. Sharma O.P, Text Book of fungi, Tata– McGraw Hill Publishing Company Limited, New Delhi
9. Sharma P D: The fungi, Rastogi Publication Meerut
10. Thakur Anil K, Bassi Susheel K, Diversty of microbes and Cryptogams. S. Chand and Company, New Delhi
11. Trainor F. R. Introductory Phycology, John Wiley and Sons Inc. New York.

PRACTICALS **Total Hours-36 Hrs**

2hrs/Wk

1. Make micro preparations of vegetative and reproductive structures of the following types and make labelled sketches of specimens observed- *Pythium, Rhizopus, Saccharomyces, Pencillium, Peziza, Puccinia, Agaricus, Cercospora, Chlorella, Volvox, Ulothrix, Cladophora, Zygnema, Oedogonium, Chara, Vaucheria, Pinnularia, Sargassum, Polysiphonia* and *Usnea*.

Reg. No.:……

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III Semester B.Sc. Degree Examinations.

BOTANY (Core)

CORE COURSE - III

COURSE CODE - 3B03BOT/PLS - PHYCOLOGY , MYCOLOGY AND LICHENOLOGY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. The common stored food in Fungi
   a) Starch b) Glycogen c) Protein d) Fat
2. Lamiarin and Mannitol are the food reserves in;
   a) Green algae b) Red algae c)Diatoms d) Brown algae
3. Synzoospores are present in
   a) Vaucheria b) Volvox c) Oedogonium d) Chara
4. An ascocarp which is flask shaped
   a) Cleistothecium b) Perithecium c) Apothecium d) Hypothecium

4x1=4

Section B *(Answer any eight)*

5. Mention the important pigments found in Red algae
6. What are conceptacles.
7. Explain the structure of Usnea apothecium?
8. What are different types of Lichens?
9. What are isidia?
10. What are fungi imperfecti? Give an example
11. Explain the use of fungi in industries.
12. Draw a labeled diagram showing the structure of gills.
13. Explain the mycelium of Pythium.
14. Explain Zygospore formation in Rhizopus?
15. Explain auxospore formation in Pinnularia
16. Give an account of sex organs in Chara.

8x2=16

Section C *(Answer any four)*

17. Explain cell division in Pinnularia.
18. Describe the asexual reproduction in Volvox
19. Explain asexual reproduction in Penicillium?
20. Explain ihe apothecium of Peziza.
21. Explain the economic importance of Lichens.
22. Explain sexual reproduction in Oedogonium.

4x3=12

Section D *(Answer any one)*

23. Explain alternation of generations in Cladophora with diagrams.
24. Explain the life cycle of Puccinia with labeled diagrams.
25. Describe the sexual reproduction in Polysiphonia

1x8=8

B.Sc. PLANT SCIENCE
GENERAL COURSE –2
COURSE CODE: 3A12PLS - HORTICULTURE

No. of credits: 2 **Total hours: 54 hrs**

MODULE 1 **12 Hours**

History, Scope and divisions of Horticulture, garden tools and implements- Methods of vegetative propagation-cutting, layering and grafting. Propagation by specialized stem and roots-bulbs, corms, tubers, rhizomes and pseudobulbs. Media for propagation of nursery plants- characteristics of media- common media for propagation- soil, sand, peat, sphagnum moss, vermin culite. Soil mixture and nursery beds. Manures: Organic and inorganic; Irrigation methods.

MODULE 2 **12 Hours**

Important ornamentals-habit and types. Types of gardens-Indoor garden, Kitchen garden and public garden. Garden components- lawn making, glass house, rockery, water garden and topiary. Landscaping- Principles of landscaping designs, components of landscape designs, lawn grass varieties, Arboriculture and role of trees in landscaping.

MODULE 3 **15 Hours**

Olericulture- Definition- Importance of vegetables- Production technology- Cultivation of vegetables- Bhindi, Brijal, Bitter gourd, Pumpkin, Colocasia, Tapioca and Tomato.28 Pomology- Definition and Importance-Cultivation of fruits- Banana, Pineapple and mango. Growth regulators in horticulture. Plant protection measures for horticultural crops.

MODULE 4 **11 Hours**

Floriculture- Definition and Importance- Cultivation of flowers- Jasmine, Rose, Chrysanthemum, Gladiolus, Aster Orchids and Anthurium.

MODULE 5 **4 Hours**

Preservation of fruits and vegetables; Cut flowers- Flower arrangement and Bonsai. .

PRACTICALS **36 Hours**

1Demonstration of vegetative methods of propogation

2Flower arrangement with cut flowers

3Preparation of potting mixture with known composition

4Visit to well established nursery.

REFERENCES

1. Bhattacharjee, S.K. 2006. Advances in Ornamental horticulture. Pointer Publications, Jaipur.

2. Bose, T. K, J. Kabir, P. Das and P.P. Joy. 2001. Tropical Horticulture. Naya Prakash Publications, Calcutta.

3. Chaha, K.L. 2001. Handbook of horticulture. ICAR, New Delhi.

4. Desh Beer Singh and Poonam Wazir. 2002. Bonsai- an Art. Scientific Publishers, Jodhpur.

5. Edwin Biles. 2003. The Complete book of gardening. Biotech book, New Delhi

6. Kumar, N. 1999. An introduction to horticulture. Rajalakshmi Publication, Nagarcoil.

7. Sharma, V.K. 2004. Advances in Horticulture: Strategies, production, plant protection and value addition- Deep and Deep publications, New Delhi. 8. Singh, S.P. 1999. Advances in Horticulture and Forestry. Scientific publishers, Jodhpur.

Reg. No:……

Name :……..

III Semester BSc Degree Examinations
Plant Science (Core)
General Course

COURSE CODE: 3A12PLS - HORTICULTURE

Time: 3 Hours **Total Marks: 32**

Section A (Answer *All)*

Choose the correct answer

1. The process of breaking dormancy of seed by cracking is called as
   (Scarification, stratification, sterilization, none of these)
2. A natural green carpet of garden in called----------
   (Lawn, Hedge, Ikebana, Silviculture)
3. Exposing pest infested plant materials to gaseous pesticides is called
   (Fertigation, Fumigation, Smoking, Brining)
4. The branch of horticulture, which deals with the cultivation of fruits, is
   (Pomology, Olericulture, Arboriculture, Floriculture)

4×1=4

Section B (Answer any *four)*

5. What is the significance of glass houses in Horticulture?
6. How can you prolong the vase life of cut flowers?
7. During rooting periods of bulbs and corms, soil should be low in nitrates- explain.
8. What are suckers? How suckering can be promoted?
9. Write a critical note on drip irrigation.
10. Briefly describe the method of potting orchid plants.
11. Differentiate between Rockery and Topiary.

4×2=8

Section C (Answer any *four)*

12. Briefly describe the various methods of preservation of fruits and vegetables.
13. Give a brief description of different methods of pruning and its significance in trees.
14. Write briefly on the cultivation methods used in Anthurium. Give the name of two commonly cultivated varieties.
15. Describe at least three different types of layerage and indicate their special applications.
16. Describe the common garden tools and implements.
17. Give an account of various plant protection measures for horticultural crops.
18. Write briefly on the cultivation methods used in Tomato, Bhindi and Brinjal.

4×3=12

Section D (Answer any one)

19. Describe the various steps to grow Bonsai.
20. How can a good lawn be prepared? Describe the different methods of Lawn preparation?
21. Give an account of the different types of growth regulators and their uses in Horticulture.

1×8=8

B.Sc. PLANT SCIENCE
GENERAL COURSE – 1
COURSE CODE: 3A11PLS - PLANTATION SCIENCE

Credit -2 Total Hours- 54

Module I. Introduction **4** hours

History and evolution of Agriculture in India. Importance of plantation crops and spices on the economy of India. Present status of plantation crops and spices in Kerala.

Module II. Botany of Crops **15** hours

Study of the plantation crops and spices mentioned below in relation to the following aspects- importance, origin, distribution, morphology, taxonomy, floral biology and morphology of useful parts - tea, coffee, rubber, coconut, arecanut, cashew, pepper and cardamom.

Module III. Propagation of crops **4** hours

Seed propagation and vegetative propagation. Budding, grafting, and layering. Nursery practices- production of planting materials.

Module IV. Agronomic practices **10** hours

Study of the agronomic practices of the crops mentioned with special reference to - Soil and climate, land preparation and planting techniques, organic manure and fertilizers, growth regulators, Irrigation and fertigation, Inter cropping and mixed cropping

Module V. Diseases **10** hours

Study of the symptoms, etiology, crop loss and management of the major fungal diseases of crops mentioned earlier. Major plant protectants- fungicides, bactericides, pesticides, and herbicides. Biological control of pests and diseases. Integrated pest and disease management.

Module VI. Harvesting and post- harvest management **11** hours

Study of the harvesting, storage , processing, value addition and marketing of the economically important products of the crops mentioned earlier. By -product and their utilization. Grading of the products of above crops.

PRACTICALS **36** hours

1. Field identification of crops mentioned in the syllabus.

2. Visit to a major estate, plantation or factory to study harvesting and processing techniques

3. Visit to major R & D centres and quality control laboratories of the above crops

4. Field identification of the common diseases of the crop plants mentioned in the syllabus.

5. Familiarization with agronomic practices of any 2 crops mentioned earlier.

6. Collection of different grades of marketed products of crops mentioned in the syllabus.

REFERENCES

1. Bavappa, K.V.A, Nair, M. K and Kumar, T. P. 1982. The Arecanut Palm, CPCRI

2. Child, R. 1974. Coconuts. Longman

3. Gordelia, P. 1979. Profiles of Tea. Oxford and IBH pub. Co.

4. Harer, A. E. 1971. Coffee Growing. Oxford University

5. Kerala Agri. University. 2011. Package of practices recommendations. Mannuthy

6. Narayanan, P. K. 1976. Rubber and its cultivation, Rubber Board, Kottayam

7. Paulose, T.T. 1972. Arecanut and Spices, a grower handbook. Directorate of Arecanut & Spices

8. Pillai, K. M. 1984. A text book of plantation crops. Vani Educational Books.

9. Rao, E. V. V. and Khan, H. H. 1984. Cashew Research and Development. Proc. Symp. Cahew, Cochin

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Reg. No:……
Name : ……

III Semester BSc Degree Examinations
Plant Science
General Course -1
COURSE CODE: 3A11PLS - PLANTATION SCIENCE

Time: 3 Hours **Total Marks: 32**

Section A *(Answer all)*

1. The binomial nomenclature of pararubber is ----------
   a) Hevea brasiliensis b) Jatropha curcas c) Camellia sinensis d) Euphorbia tirucalli
2. Causal organism of Leaf rust of Coffee is
   a) Hemileia vastatrix b) Colletotrichum c) Exobasidium vexans d) Phytophthora palmivora
3. Growing pulses and fodder crops along with plantation crops is called
   a) Intercropping b) mixed cropping c) Rotation of crops d) None of these
4. Copper oxychloride is used as
   a) Insecticide b) Fungicide c) Herbicide d) Bactericide

4x1=4

Section B *(Answer any four)*

5. Write a note systemic fungicides. Give two examples
6. What are the basic factors that influence soil properties ?
7. Write a note on the control of bud rot of Coconut.
8. Write the floral biology of Cashew
9. Describe the post harvesting practices of Coffee
10. Describe the symptoms of 'abnormal leaf fall' of Rubber
11. What is meant by biological control ? Give an example.

4x2=8

Section C *(Answer any four)*

12. Briefly describe the nursery management and cultivation of Rubber.
13. What are the commercial uses of Auxins ?
14. Write critical note on 'drip irrigation'
15. Describe two grafting methods with suitable diagrams
16. Explain the economic importance and morphology of useful part of Rubber and Coffee
17. Write a short note on food and commercial products of Coconut.

4x3=12

Section D *(Answer any one)*

18. Write an account on cultivation of Tea. Describe morphological and floral characters of the Tea plant
19. Explain the role of plantations in the economy of Kerala.
20. Write an essay on harvesting and post harvesting practices of Arecanut, Pepper, Tea and Cashew.

1x8=8

CORE COURSE – Theory IV

BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS AND PALEOBOTANY

COURSE CODE-4B04BOT/PLS

No. of credits-3 **Total Hours- 54**

3 hrs/Wk

Module I- Bryology **16 hrs.**

Bryophytes-introduction - Salient features and classification-study of the habitat, distribution, habit, thallus organization, internal anatomy, vegetative, asexual and sexual reproduction, sporophyte, life cycle and distinctive features of *Riccia, Marchantia, Anthoceros* and *Funaria*. **(**Developmental details are not required). Origin and evolution of bryophytes- relationships with algae and pteridophytes- brief account of the development of bryology in India- economic and ecological importance of bryophytes.

Module 2- Pteridology **16 hrs**

Pteridophytes- Salient features and Classification (Reimer's)- Study of the habitat, distribution, habit, anatomy, reproduction and life cycle of *Psilotum, Selaginella, Equisetum, Nephrolepis* and *Marsilea*. **(**Developmental details are not required). Origin and evolution of pteridophytes- relationships of pteridophytes with bryophytes and gymnosperms- brief account of the development of pteridology in India, Stelar evolution in pteridophytes, heterospory and seed habit. Ecological and economic importance of pteridophytes.

Module 3. Gymnosperms **16 hrs**

Introduction - Salient features and Classification (Sporne's) .study of the habitat, distribution, habit, anatomy, reproduction and life cycle of *Cycas, Pinus* and *Gnetum* (Developmental details not required). Origin and evolution of gymnosperms- Ecological and Economic importance- Relationship with pteridophytes and angiosperms- Indian contribution on Gymnosperms study.

Module 4. Palaeontology **6 hrs**

Objectives of palaeobotany-Fossil formation-Theories-Types of fossils. Impressions compressions, casts, molds and pertrifactions and radio carbon dating. Techniques for studying fossils- Geological time scale, Evolutionary trends. Fossil Bryophytes, Pteridophytes, Gymnosperms and Angiosperms. Brief study of the following fossils- *Rhynia, Lepidodendron, Lepidocarpon, Lyginopteris*. Applied aspects of Palaeobotany- Palaeopalynology, Exploration of fossils fuels.

References

1. Gangulee, Das & Kar. 2001. *College Botany Vol. II*. New Central Book agency Pvt. Ltd. Culcutta. .
2. Pandey S.N, Misra S.P, Trivedi P.S.1962 . *A Text Book of Botany Vol. II*. Vikas Publishing House, New Delhi.
3. Pandey, B.P. 1981. *Gymnosperms*. S. Chand & Co., New Delhi.
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11. Vashishta, P.C. 1992. *Botany for Degree Students- Pteridophyta*. S. Chand and Co. Ltd.
12. Vashishta P.C, Sinha A.K, Anil Kumar. 2006. *Botany for Degree students- Gymnosperms*. S.Chand & company Ltd.
13. Shukla A and Mishra S.P 1982, Essential of Paleobotany, Vikas Publishing House Pvt.Ltd.
14. Strwart W.N (1983) paleobotany and Evolution of plants-Cambridge University press.

PRACTICALS **Total Hours-36 Hrs**

2hrs/Wk

1. *Riccia*- habit-internal structure of thallus-V. S. of thallus through archegonia, antheridia and sporophyte
2. *Marchantia*-.habit, thallus v.s, thallus with archegonial receptacle, antheridial receptacle, male receptacle V.S, female receptacle V.S, T.S of thallus through gemmae cup, V.S of sporophyte..
3. *Anthoceros*- habit-internal structure of thallus-V. S. of thallus through archegonia, antheridia, sporophyte V.S.
4. *Funaria*- habit, V.S.of archegonial cluster, V.S.of antheridial cluster, sporophyte V.S.
5. *Psilotum* : external features, stem T.S., synangium T.S
6. *Selaginella:* habit, rhizophore T.S, stem T.S, axis with strobilus, Megasporophyll and Microsporophyll
7. *Equisetum* – Habit, rhizome T.S, stem T.S., strobilus V.S.
8. *Nephrolepis*- Habit, petiole T.S., sporophyll T.S., prothallus
9. *Marsilea*- Habit, rhizome and petiole T.S, Sporocarp T.S, V.S & R.L.S
10. *Cycas*- seedling, coralloid root-entire and T.S., leaflet T.S, petiole T.S., male cone L.S., microsporophyll, micro sporophyll T.S., megasporophyll, ovule entire and L.S.
11. *Pinus* – Branch of indefinite growth, spur shoot, T.S of old stem, needle T.S., male cone, male cone V.S., female cone, female cone V.S.
12. *Gnetum*- Habit, stem T.S(young and mature), leaf T.S, male strobilus, female strobilus, V.S of male cone, V.S. of female cone, V.S of ovule, seed entire.
13. Fossil pteridophytes- *Rhynia* Stem, *Lepidodendron, Lepidocarpon*. Fossil Gymnosperm- *Lyginopteris*

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IV Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE -4B04BOT/PLS- BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS AND PALEOBOTANY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

21. Gametophytic generation is dominant in
    a) Pteridophytesb) Bryophytes c) Gymnosperms d) Angiosperms
22. Stele in Selaginella is
    a) Siphonostelic b) Solenostele c) Protostelic d) Dictyostelic
23. Anthoceros is commonly known as
    b) Bladderwortsb) Hornwots c) stoneworts d) Liverworts
24. The spore with Elaters are found in
    a) Marsilea b) Selaginella c) Adiantum d) Equisetum

4x1=4

Section B *(Answer any Eight)*

25. What are Petrifactions
26. Mention the primitive features found in Psilotum.
27. Explain the important features of Equisetum cone
28. Mention the Objectives of Palaeobotany
29. What are vallicular Canals
30. Explain the structure of archegonia in Riccia
31. What are synangia?.
32. What are transfusion tissues?.
33. Draw a labeled diagram showing the structure of sporocarp of Marsilea .
34. Briefly explain stelar evolution in Pteridophytes.
35. What are coralloid roots?
36. Write short notes on Rhizophores.

8x2=16

Section C *(Answer any four)*

37. Explain the Xerophytic adaptations in Pinus needle..
38. Mention the advanced features of Anthoceros Sporophyte.
39. Give a detailed account of the classification of Bryophytes ?
40. Briefly explain the reproductive structures in Gnetum. .
41. Explain the structure of Lepidodendron.
42. Give an account of the economic importance of Pteridophytes.

4x3=12

Section D *(Answer any one)*

43. Explain the life cycle of Marchantia with labeled diagrams
44. With diagrams explain sexual reproduction in Cycas
45. Explain the origin and evolution of Pteridophytes.

1x8=8

B.Sc. PLANT SCIENCE
GENERAL **COURSE** –4
COURSE CODE: 4A14PLS - PLANTATION MANAGEMENT

Credits- 2 **Total hours-54 hrs**

MODULE – I FARM MANAGEMENT **15Hrs**

Principles of farm management – Planning and Budgeting in the cultivation of following crops: Tea, Coffee, Rubber, Cardamom, Coconut, Areca nut, Cashew, Black Pepper. Study of the following farm machineries and equipments in relation to plantation crops-garden tiller, weed cutter, sprayers(rocker, knap sack, power),dusters(traction, wet, rotary), rubber roller, de huskers for coconut and areca nut, palm climber.

MODULE- II. HUMAN RESOURCE MANAGEMENT **15Hrs**

Management process: Basic concepts, Leadership-qualities of a good leader-leadership styles. Motivation, morale and productivity(brief account only). Communication- definition, formal and informal communication. **Introduction to Human Resource Management:** HRM - definition - HRM and personnel management - HR function - role of HR manager - HR planning -recruitment, selection and placement. **Training and Development:** Orientation and training - need for training - training techniques - quality of life and quality of work life - performance appraisal - Career development. **Labour Relations and Employee Security:** Trade unions and their role in organizations - collective bargaining - labour participation in management - labour disputes - grievance settlement procedure, layoff, lockout and retrenchment - management of conflict.

MODULE- III ECONOMICS OF PLANTATION CROPS **12Hrs**

The Role of Agriculture in a Growing Economy: Interdependence between agriculture and industry- Role of plantation Crops in a growing economy (Tea, Coffee, Rubber, Cashew and Cardamom). **The Economics of Plantation Crops in the New Economic Environment**- Factors Affecting Growth of Plantations **(** Tea, Coffee, Rubber, Cashew and Cardamom) - production and productivity - - Problems of plantation cultivation – suggestions to improve plantation farming. **Plantation cultivation in Kerala Economy :**. Social and environmental impacts of plantation farming-- Need for technological advancements in Plantation sector.

MODULE -IV LEGAL ASPECTS OF PLANTATION MANAGEMENT **12Hrs**

The Plantation Labour Act, 1951: Definitions - Registration of Plantations - Inspecting staff - Provisions as to health - welfare - Hours and limitation of employment - Leave with wages - Accidents - Penalties and procedure. **Minimum Wages Act, 1948**: Interpretation - Minimum rates of wages - Advisory committee - Advisory boards - Payment of minimum wages. **Employees State Insurance Act, 1948:** Administration of insurance corporation - Standing committee - Medical benefit council - Employees state insurance fund - Contribution - Benefit - Sickness benefit - Maternity - Disablement benefit - Dependents benefit. Medical benefit - Liability of the employer. **The Kerala Preservation of Trees Act, 1986:** The object of the act, authorized officer and appellate authority- their powers. Restriction regarding cutting of trees- penalties.

Practicals: 36Hrs

1. Visit to one plantation farming sector to study the management of crops.
2. Identify the farm equipments mentioned in the syllabus and familiarise the working.
3. Organize a leadership development programme.
4. Visit to a labour welfare office to acquaint with labour issues.

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2. Ashwathappa, K., Human Resource Management

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6. Edwin B Flippo, Personal Management
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8. Gulsian, P.C., Business Law
9. Heady, E.A., Economic s of Agricultural Production and Resource Use. Prentice Hall.
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13. John Herman herbst, Farm management: principles, budgets and plans.,Stipes Pub.Co.1976
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17. Prasad, L.M., Principles of Management
18. Publications of Commodity Boards, Development Boards, UPASI and other agencies on Plantation economics.
19. Reji D Nair, Farm Management- Theory and Practice, Jawahar Books
20. Robertson, C.A., An Introduction to Agricultural Production Economics and Farm Management. Tata Mc Graw Hill.
21. Ronald D Kay, Farm Management. Tata Mc Graw Hill Education Private Ltd.
22. Sundaram, K.P.M., Indian Economy, S. Chand Publishers.
23. Thampan, P.K., Hand book on Coconut Palm, Oxford and IBH publishing Co. 1989

Reg. No.:……
Name:……

IV Semester B.Sc Degree Examinations
Plant Science
General Course - IV
COURSE CODE: 4A14PLS – PLANTATION MANAGEMENT

Time: 3 Hours **Total Marks: 32**

Section A ***(Answer all)***

46. RSS IV is a trade name associated with ----------
    a) Rubber b) Cardomum c) Coffee d) Areca nut
47. Which of the following is not a sprayer?
    a) Rocker b) knap sack c) traction d), power
48. The Kerala Preservation of Trees Act was passed in……
    a) 1985 b) 1871 c) 1968 d) 1986
49. Which of the following have highest market price?
    a) Coffee b) Tea c) Coconut d) Arecanut

4x1=4

Section B ***(Answer any four)***

50. Differentiate between Production and Productivity
51. Draw and label the parts in a rocker spryer.
52. Briefly explain the planning strategies in a cashew plantation.
53. Mention any four types of leaders.
54. Distinguish between Orientation and Training.
55. Mention the important features of Minimum Wages Act 1948.
56. What are the advantages of effective communication?

4x2=8

Section C ***(Answer any four)***

57. What are the environmental impacts of Tea plantations?
58. Describe how you can introduce advanced technology in a Rubber plantation?
59. Explain the planning carried out before the conduct of a Leadership development programme.
60. What are the important factors affecting the growth of Coconut plantation in Kerala?
61. Describe briefly planning and budgeting in a Tea estate in Wayanad district of Kerala.
62. Explain the importance of Coffee plantations in the economy of Kerala.
63. Write a short note on the value added products obtained from Areca palm.

4x3=12

Section D ***(Answer any one)***

64. Write an essay on the social impacts of plantations in the Malabar region of Kerala.
65. Explain the labour relations and employees security in Plantations .

1x8=8

B.Sc. PLANT SCIENCE
GENERAL COURSE – III
COURSE CODE: 4A13PLS -HERBAL SCIENCE

No. of credits- 2 **Total hours-54**

MODULE-1: **9hrs**

Historical background, present status, scope of Medicinal botany – Indigenous medical systembioprospecting, indigenous knowledge systems, Ayurveda, Siddha, unnani,Homeopathy,Tibetan, Folkore medicines, Systems of medicine. Need to preserve knowledge systems.

MODULE -2: **12 hrs**

Cultivation of medicinal plants**:**Conventional (sexual and vegetative) – Sexual propagation – Seed viability – Seed dormancy, types, methods of overcoming – Vegetative propagation –Budding - Grafting – Layering; Seed propagation. Cultivation of medicinal plans – Amla (*Phyllanthus emblica*), Glory lily (*Gloriosa superba*), Sadavari (*Asparagus racemosus*), periwinkle (C*atharanthus roseus)*, Sarpagandha (*Rauvolfia serpentina*), Aloe (*Aloe vera*). Medicinal plants in wasteland management. Medicinal plants types suitable for cultivation in public gardens.

MODULE -3 **6 hrs**

Introduction and scope -Herbal preparations- General methods of phyto chemical & biologicalscreening– extraction– Maceration, digestion, decoction, aromatic waste, extracts and tinctures.Purification and isolation of Plant constituents – Alkaloids – Glycosides – Volatile oils

MODULE -4 Commercial Aspects in Herbal Science: **12 hrs**

Study of some herbal formulation as drug and cosmetics. Antioxidants and human health benefits. Drugs from leaves ,flower, seed, barks and roots. General properties of drug constituents: glycosides, saponins, enzymes, alkaloids, tannins, volatile oils, resins, gums, proteins and fixed oils.

MODULE -5 Ethnomedicine **10 hrs**

Introduction-definition-scope. Role of AYUSH, NMPB, CIMAP and CDRI. Plants in primary health care: Common medicinal plants – chittamruthu (*Tinospora cordifolia*), tulasi (*Oscimum sanctum*), thippali (*Piper longum*), Karaka (*Terminalia chebula*), katarvazha (*Aloe vera*),Turmeric (*Curcuma longa*). Traditional medicine vs Modern medicine: Study of select plant examples used in traditional medicine as resource (active principles, structure, usage and pharmacological action) of modern medicine: Amukkaram (*Withania somnifera*), Sarpagandhi (*Rauvolfia serpentina*)*,* keezharnelli *(Phyllanthus amarus),* nelli(*Phyllanthus emblica*) and Brahmi (*Bacopa monnieri*). Medicinal plant conservation

.

MODULE -6 **5 hrs**

Intellectual Property Rights: Patent, Plant variety protection bill, geographical indications, trade secrets, data base, trade mark, copy right, patent applications notification, sanctioning, Indian patent act, TRIPS, farmers right, biopiracy, status of WTO.

PRACTICAL **36 Hours**

1Identification and description of medicinal plants
2Breaking of dormancy by scarification,acid treatment
3Study of viability of different seeds-germination test-tetrazolium test
4Cultivation of medicinal plants.

REFERENCE

1. Atal, C.K. - Cultivation and Utilization of Medicinal Plants. R.R.L. Jammu.

2. Chada, K.L., Ravindran, P.N., and Leela Shajiram, 2000. Biotechnology in horticultural and plantation crops. Malhotra Publishing House, New Delhi.

3. Joshi, S. G. 2000. Medicinal Plants. Oxford and IBH, New Delhi.31
4. Kapoor L.D, 2005 Hand book of Ayurvedic medicinal plants, CRCpress Anes books NewDelhi

5. Kokate D.C.K,A.S Gokhale and S.B Gokhale . cultivation of medicinal plants ,2004 niraliprakashan Pune.

6. Kokate, C. and Gokeale- Pharmocognacy- Nirali Prakashan, NewDelhi

7. Rastogi, R. R. and B. N. Mehrotra. 1993. Compendium of Indian Medicinal Plants. Vol. I & Vol. II. CSIR, Publication and Information Directorate, New Delhi

8. Sambamurthy AVSS. and N.S Subramanyam, 1989 text book of Economic botany. Wiley Eastern Ltd.

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Reg. No:……
Name : ……

IV Semester B.Sc Degree Examinations
Plant Science
General Course-III
COURSE CODE: 4A13PLS – HERBAL SCIENCES

Time: 3 Hours **Total Marks: 32**

Section A (Answer *All)*

Choose the correct answer

1. Dioscorides was a --------- physician

a) Greek b) French c) German d) Latin American

2. Herbal medicines have become popular in recent years, since it is believed that they are

a) sacred b) cheaper c) without side-effects d) none

3. Tannins are used in medicine because of their …….property

a) diuretic b) astringent c) colouring d) none

4. Katarvazha belongs to the family a) Musaceae b) Zingiberaceae c) Liliaceae

d) Cannaceae

4 ×1=4

Section –B (Answer any *Four)*

5. Differentiate the seed viability and seed dormancy.

6. Write a short note on medicinal plant conservation.

7. Give an account of cultivation of Aloe.

8. Explain the medicinal use of '*Phyllanthus emblica*.

9. Describe 'Plant Variety Protection act'

10. Write notes on extraction methods- tincture and decoction

11. Briefly explain 'Biopiracy

4×2=8

Section C (Answer any *four)*

12. Write notes on indigenous knowledge systems- Ayurveda and Siddha
13. Give an account of cultivation and medicinal properties of 'Thippali'.
14. Write an account of medicinal plants suitable for the cultivation in public gardens and Waste lands.
15. Write a short note on the drugs obtained from root and stem .
16. Explain the medicinal uses of *Withania somnifera*. What are the major active principles Present in this plant ?
17. Briefly explain different forms of of IPR
18. Give an account of the cultivation and medicinal properties of 'Turmeric'.

4×3=12

Section D (Answer any ***one)***

19. Describe various drug constituents.
20. Describe the cultivation and medicinal uses of any four medicinal plants you have studied.
21. Explain the purification and isolation of plant constituents giving special reference to alkaloids and volatile oils

1×8=8

CORE COURSE – PRACTICAL -I
COURSE CODE-4B05BOT/PLS

SEMESTER-I

ENVIRONMENTAL SCIENCE AND PHYTOGEOGRAPHY

PRACTICALS **Total Hours-36 Hrs**

1. Visit a local polluted site and documentation of major pollutants/Reserve forest.
2. Study of plant community by quadrat method.
3. Study of ecological and anatomical modification of xerophyte, hydrophyte and epiphyte.
4. Estimation of DO and BOD and calculate the primary productivity.
5. Estimation of dissolved carbon dioxide in water
6. Knowledge of ecological instruments- hygrometer, rain gauge, anemometer, altimeter,
1. luxmeter, wet and dry bulb thermometer, salinometer, water sampler, GPS (with the
2. help of equipment/digram or photograph)

SEMESTER-II

ANGIOSPERM ANATOMY AND MICROTECHNIQUE

PRACTICALS **Total Hours-36 Hrs**

ANATOMY

1. Non living inclusions – Cystolith, Raphides, Aleurone grains; Starch grains –Eccentric, concentric, compound
2. Apical meristem – Root apex and stem apex.
3. Simple permanent tissues – Parenchyma, Chlorenchyma, Aerenchyma, Collenchyma and Sclerenchyma.
4. Secretory tissues – Resin canal, Nectory, Laticifers – articulated and non-articulated Latex vessels.
5. Lysegenous and schizogenous cavities.
6. Epidermal structures – Trichomes, Glands, Stomata.
7. Primary structure – Dicot stem – *Hydrocotyle, Cephalandra, Eupatorium* or any dicot stem; Monocot stem – Bamboo, Grass, *Asparagus* or any monocot stem; Dicot root – *Tinospora*, *Ficus*, Pea; Monocot root – *Colocasia, Hedychium, Pandanus* or any monocot root.
8. Secondary structure – Stem (Normal type) – *Tinospora, Vernonia* or any other normal type; Root (Normal type) – *Tinospora, Ficus, Carica papaya*, *Ricinus* or any other normal type.
9. Anomalous secondary thickening – *Bignonia, Boerhaavia*.
10. Leaf Anatomy – Dicot leaf: *Ixora*; Monocot leaf: Grass

MICROTECHNIQUE

1. Photomicrography and camera lucida drawings.
2. General awareness of Micro technique - maceration, smears & squash.
3. Microtome sectioning and hand sectioning.
4. Preparation of permanent slides.

SEMESTER-III

PHYCOLOGY, MYCOLOGY AND LICHENOLOGY

PRACTICALS **Total Hours-36 Hrs**

1. Make micro preparations of vegetative and reproductive structures of the following types and make labelled sketches of specimens observed-*Pythium, Rhizopus, Saccharomyces, Pencillium, Peziza, Puccinia, Agaricus, Cercospora, Chlorella, Volvox, Ulothrix, Cladophora, Zygnema, Oedogonium, Chara, Vaucheria, Pinnularia, Sargassum, Polysiphonia* and *Usnea*.

SEMESTER-IV

BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS AND PALEOBOTANY

PRACTICALS **Total Hours-36 Hrs**

1. *Riccia*- habit-internal structure of thallus-V. S. of thallus through archegonia, antheridia and sporophyte
2. *Marchantia*-.habit, thallus v.s, thallus with archegonial receptacle, antheridial receptacle, male receptacle V.S, female receptacle V.S, T.S of thallus through gemmae cup, V.S of sporophyte..
3. *Anthoceros*- habit-internal structure of thallus-V. S. of thallus through archegonia, antheridia, sporophyte V.S.
4. *Funaria*- habit, V.S.of archegonial cluster, V.S.of antheridial cluster, sporophyte V.S.
5. *Psilotum* : external features, stem T.S., synangium T.S
6. *Selaginella:* habit, rhizophore T.S, stem T.S, axis with strobilus, Megasporophyll and Microsporophyll
7. *Equisetum* – Habit, rhizome T.S, stem T.S., strobilus V.S.
8. *Nephrolepis*- Habit, petiole T.S., sporophyll T.S., prothallus
9. *Marsilea*- Habit, rhizome and petiole T.S, Sporocarp T.S, V.S & R.L.S
10. *Cycas*- seedling, coralloid root-entire and T.S., leaflet T.S, petiole T.S., male cone L.S., microsporophyll, micro sporophyll T.S., megasporophyll, ovule entire and L.S.
11. *Pinus* – Branch of indefinite growth, spur shoot, T.S of old stem, needle T.S., male cone, male cone V.S., female cone, female cone V.S.
12. *Gnetum*- Habit, stem T.S(young and mature), leaf T.S, male strobilus, female strobilus, V.S of male cone, V.S. of female cone, V.S of ovule, seed entire.
13. Fossil pteridophytes- *Rhynia* Stem, *Lepidodendron, Lepidocarpon*. Fossil Gymnosperm- *Lyginopteris*

MODEL QUESTION PAPER

CORE PRACTICAL -1

(Courses of semester I, II, III and IV)

Environmental Science and Phytogeography
Angiosperm Anatomy and Microtechnique
Phycology, Mycology and Lichenology
Bryology, Pteridology, Gymnosperms and Paleobotany

Time-3Hrs **Max.marks-60**

1. Take a transverse section of specimen A stain,mount in glycerine,draw a cellular diagram of a portion enlarged,label the parts,identify giving reasons,leave the preparation for valuation

   Section-4, identification-1, reasons-2, diagram-2 (9 marks)

2. Take a transverse section of material B, identify ecological group and comment on its adaptation
   Identification-1, adaptations-3 (4 marks)

3. Take transverse sections of materials C,D,E,F identify giving reasons
   Section-1, Identification-1, reasons-3
   (4x4=16 marks)
4. Identify material G with reasons
   Identification-1 reasons-2 (3 marks)
5. Write critical notes on H (3 marks)
6. Comment on I,J,K,L,M (3x5=15 marks)
7. Spot at sight N,O,P,Q,R,S (1x6=6 marks)

Key to the specimens

1) Anatomy 2) Ecology 3) Algae or Fungi , Bryophyte, Pteridophyte, Gymnosperm 4) Lichen 5) Paleobotany 6) Algae, Fungi, Bryophyte, Pteridophyte, Gymnosperm reproductive part 7) Ecology, Anatomy, Microtechnique

B. Sc Plant Science

General Practical I – Model question Paper

4A15PLS-Horticulture, Plantation Science, Herbal Science and Plantation management

Time 3 hours **Maximum marks-30**

1. Demonstrate budding on specimen **A** and write the procedure.

   Procedure 1 marks, conducting 2 marks (3 marks)

2. Demonstrate grafting on specimen **B** and write the procedure.

   Procedure 1 marks, conducting 2 marks (3 marks)

3. Demonstrate layering on specimen **C** and write the procedure.

   Procedure 1 marks, conducting 2 marks (3 marks)

4. Demonstrate hybridisation on specimen **D** and write the procedure.

   Procedure 1 marks, conducting 2 marks (3 marks)

5. Identify the disease **E** and **F**, name the pathogen, mention any two important symptoms, and write any two control measures.

   Identification of disease 1 mark, pathogen 1 mark, Important symptoms and control measures 1 mark (2× 3 =6 marks)

6. Identify the source plant of **G** and **H**. Write its binomial and family

   Binomial 1 mark, Family 1 mark (2×2 =4 marks)

7. Describe the floral morphology of **I**.

   Floral morphology 1 marks (1 marks)

8. Write the process of harvesting and processing of **J**. (1+2=2 marks)

9. Write name and function of the tools **K** and **L**

   Name 0.5, Function 1 (1.5×2= 3marks)

10. Spot at sight **M** and **N.** Write the binomial

    Binomial 1 mark (2×1 = 2 marks)

Key to Specimens

1. Material **A** for budding – T budding

2. Material **B** for grafting – Tongue grafting

3. Material **C** for layering – Air layering

4. Material **D** for hybridisation – using Crotalaria, Cassia, etc

5. Material **E** and **F** pathology specimens mentioned in the plantation science syllabus

6. Material **G** and **H**. Any two marketed products of plantation crops mentioned in the syllabus

7. Floral biology of **I**. Flower of any plantation crop mentioned in the syllabus. (Other than G and H)

8. Material **J**. Any plantation crop mentioned in the syllabus.

9. Any two Horticulture tools- **K** and **L**

10. Specimen **M** from Olericulture and **N** from Herbal science

CORE COURSE – Theory V

TAXONOMY , MORPHOLOGY AND ECONOMIC BOTANY

COURSE CODE - 5B06BOT/PLS

Credit: 4 **Total hrs: 36 hrs**
2 hrs/wk

Module-1- Systematics : **4 hrs**

History,objectives and relevance of Systematics,Systems of classification: Artificial, Natural and Phylogenetic; Brief account of Linnaeus'and Engler and Prantl's system and APG system(2003).A detailed study of Bentham& Hooker's system-Merits and demerits

Module-2 Nomenclature: **6 hrs**

Principles and rules of Botanical Nomenclature, ICBN, Latest code –brief account, Ranks of taxa, Type concept, Rule of priority, Author citation. **Plant identification**: Taxonomic literatures- Floras, Herbaria-kinds, Importance of Herbaria, Important Herbaria,Botanical gardens-roles, important botanical gardens.

Module-3 Study of the diagnostic features and economic importance of Angiosperm families

14 hrs

Annonaceae, Nymphaeaceae, Malvaceae, Rutaceae, Anacardiaceae, Papilionaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae Acanthaceae, Verbenaceae, Lamiaceae, Euphorbiaceae, Amarantaceae, Orchidaceae ,Zingiberaceae, Liliaceae, Arecaceae, Poaceae

Module-4 Morphology **6 hrs**

Vegetative and floral morphological features,Leaf morphology-Kinds of Leaves, Venation, Arrangement-phyllotaxy, ptyxis and vernation; Leaf texture- chartaceous, coriaceous, glabrous, glaucous, pubescent; Leaf shape-ovate,obovate, elliptic, oblong; Leaf margins-entire, serrate, dentate, crenate; Leaf apex – acute, obtuse, emarginate, truncate; Leaf base- acute, obtuse, truncate, cordate, sagittate. Inflorescence : Racemose, Cymose and Mixed types with examples Flower as a modified shoot, Floral parts, arrangement, relative position ,numeric plan ,cohesion and adhesion of stamens,

Symmetry of flower, aestivation types, placentation types, floral diagram and floral formula.

Fruits: Simple, Aggregate and Multiple-different types

Module-6 Economic Botany **6 hrs**

Study of the Botanical name, Family, Morphology of useful parts and Utility of the following: Cereals and millets : Rice, Wheat, Maize, Ragi, Pulses- Bengal gram, Black gram, Green gram, Red gram, Cow pea, Fruits & Vegetables- Banana, Jackfruit, Pineapple, Watermelon, Tomato, Brinjal, Pumpkin, Cucumber, Snake gourd, Bitter gourd, Spices and condiments- Cinnamon, Clove, Cardamom, Pepper Sugar-yielding plant- Sugarcane, Tuber crops - Tapioca, Amorphophallus and Colocasia; Fibre yielding–Cotton, Coir, Jute Dyes - Indigo, Henna Latex yielding - Para rubber. Oil yielding - Sesame oil, Palm oil, mustard oil, Coconut oil. Beverages-Tea ,Coffee, Cocoa.

Medicinal plants, *Phyllanthus amarus, Bacopa monnieri ,Justicia adhatoda,Catharanthus roseus and Rauvolfia serpentina*

References:

1. Baker. H.g. 1970. Plant and Civilization.
2. Cotton, C.M. 1996. Ethnobotany – Principles AND Applications. Wiley and Sons
3. Datta S C, *Systematic Botany*, 4th Ed, Wiley Estern Ltd., New Delhi, 1988.
4. Eames A. J. - *Morphology of Angiosperms* - Mc Graw Hill, New York.
5. Heywood - *Plant taxonomy* - Edward Arnold London.
6. Jain. S. K. 1995. A Manual of Ethnobotany. Scientific Publishers, Jodhpur.
7. Jain. S. K. 1981. Glimpses of Indian Economic Botany. Oxford
8. Jeffrey C .J. and A. Churchil - *An introduction to taxonomy* – London.
9. Judd, W.S., Campbell, C.S., Kellogg, E.A., Stevens, P.F., Donogue, M.J., 2002. *Plant Systematics: A Phylogenetic approach,* 2nd edition. Sinauer Associates, Inc., USA.
10. Lawrence - *Taxonomy of Vascular Plants* - Oxford & I B H, New Delhi.
11. Naik V.N., *Taxonomy of Angiosperms*, 1991. Tata Mcgraw-Hill Pub. Co. Ltd., New Delhi.
12. Pandey, S. N, and S.P. Misra (2008)-*Taxonomy of Angiosperms*- Ane Books India, New Delhi.
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19. Vashishta P. C - *Taxonomy of Angiosperms* - Chand & Co, Meerut.
20. Vasudevan Nair, R - *Taxonomy of Angiosperms* - APH Pub: New Delhi
21. Venkateswaralu, V. - *Morphology of Angiosperms* - Chand & Co.

PRACTICALS **Total Hours-72 Hrs**
4 hrs/Wk

1. Study of taxonomic features and economic importance of representative members of the following families: Annonaceae, Nymphaeaceae, Malvaceae, Rutaceae, Anacardiaceae, Papilionaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae Acanthaceae, Verbenaceae, Lamiaceae, Euphorbiaceae, Amarantaceae, Orchidaceae ,Zingiberaceae, Liliaceae, Arecaceae, Poaceae

2. Construction of dichotomous keys for the easy identification of members of the family Papilionaceae, Rubiaceae and Euphorbiaceae.- demonstration only.

3. A minimum of 20 herbarium specimens representing the prescribed families with field notes on at least 50 plants collected including any common local plants.

4. Identification of herbarium specimens and local plants.

5. Field trip to learn the plant diversity and characteristics of plant families under the supervision of teachers.

MORPHOLOGY

1. Identify with a note the different types of inflorescence, fruits and placentations.

2. Different mechanisms of fruit and seed dispersal

ECONOMIC BOTANY

Study of the Botanical name, Family, Morphology of useful parts and Utility of the following:

1. **Cereals and millets** Rice, Wheat, Maize, Ragi, Jowar, Bajra:
2. **Pulses**- Bengal gram, Black gram, Green gram, Red gram, Cow pea:
3. **Fruits and Vegetables**-Banana, Jackfruit, Pineapple, Water melon, Tomato, Brinjal, Pumpkin, Cucumber, Snake gourd, Bitter gourd:
4. **Spices and condiments**-Cinnamon, Clove, Cardamom, Nutmeg, Pepper.
5. **Sugar-yielding** plant- Sugarcane:
6. **Tuber crops** - Tapioca, *Amorphophallus* and *Colocasia*:
7. **Fibre yielding** – Cotton, Coir, Jute:
8. **Dyes** - Indigo, Henna:
9. **Latex yielding** - Para rubber:
10. **Oil yielding** - Sesame oil, Palm oil, Mustard oil, Coconut oil:
11. **Beverages**-Tea, Coffee, Cocoa:
12. **Medicinal plants**- *Gymnema sylvestre, Scoparia dulcis, Phyllanthus amarus, Saraca indica, Bacopa monnieri, Justicia adhatoda, Catharanthus roseus* and *Rauvolfia serpentina*.

Reg. No.:……

Name:……

V Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE-5BO6BOT/PLS - TAXONOMY, MORPHOLOGY AND ECONOMIC BOTANY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. The characteristic inflorescence of family Asteraceae
   a) Cyathium b) Capitulum c) Verticellaster d) Spadix.
2. Rauvolfia serpentine is a member of the family
   a) Rubiaceae b) Acanthaceae c) Pappilionaceae d) Apocynaceae
3. The family coming under order Rosales is
   a) Leguminosae b) Cucurbitaceae c) Rutaceae d) Annonaceae
4. Monocarpic palm
   a) Corypha b) Metroxylonc) Areca d) Borassus

4x1=4

Section-B (Answer any *Eight*)

5. What is ICN .Write brief note on latest code.
6. What is aestivation? Draw the aestivation in the corolla of Ixora.
7. Describe the androecium of Malvaceae
8. Give Binomial, Family and Morphology of useful part of Clove and coffe
9. What is a herbarium? Name the oldest herbarium in the world.
10. Enumerate the diagnostic features of Annonaceae.
11. Give the Binomial of any two members of family Amaranthaceae.
12. What is an aggregate fruit Give one example.
13. Comment on the statement flower is a modified shoot.
14. Describe the gynoecium of Solanaceae.
15. Importance of Systematics.
16. Describe the characters of family Zingiberaceae.

8x2=16

Section-C (Answer any *Four*)

17. Describe the spikelet of Poaceae.
18. Describe the salient features of family Nymphaceae.
19. What is placentation? Explain the different types.
20. Describe the special type of inflorescence.
21. Describe Linnaeuaes system of classification.
22. Explain the androecium in Cucurbitaceae.

4x3=12

Section D (Answer any *one*)

23. What is meant by Natural system of classification Explain with an example? Write down merits and demerits.
24. Discuss the systematic position and salient features of Asteraceae with its advanced and characters.
25. With the help of suitable diagrams explain the different types of Racemose inflorescence.

1x8=8

CORE COURSE – Theory VI
MICROBIOLOGY AND PLANT PATHOLOGY
COURSE CODE - 5B07BOT/PLS

Credit: 4 **Total hrs: 72 hrs**
4 hrs/wk

Module-1 Microbial world **15 hrs**

Introduction to microbiology – Aims, objectives, concept, scope and significance- Koch's postulates. Main groups of microorganism, Diversity of microorganism, Classification of prokaryotes, Bergey's classification (Brief accout) Bacteria:- Ultrastructure of bacteria with stress to cell wall and flagella. Bacterial growth, Nutrition, Reproduction, Economic importance of bacteria, Genetic recombination in Bacteria, General characters of Actinomycetes, Mycoplasma, Spirochetes Cyanobacteria, Rickettsia. Viruses: Classification, bateriophages and TMV. Retroviruses, HIV, Viriods, Prions.

Module- 2 Distribution of microorganism in nature **15 hrs**

Soil microbiology:- Rhizosphere, Nitrogen fixation symbiotic and nonsymbiotic Phyllosphere. Water microflora, Air microflora, Milk microflora, Food Microflora**, Biological Nitrogen fixation**: symbiotic and non symbiotic-Biochemistry of nitrogen fixation-Assimilation of nitrate and ammonium ions-Biosynthesis of amino acids-Reductive amination and Transamination- GS/GOGAT Pathway.

Module-3 Applied Microbiology **16 hrs**

Industrial microbiology:- Microbes in Dairy industry, Alcoholic fermentation, Production of enzyme, Vitamin, Antibiotics, Medicine, Alcohol, Acids, Milk products and Single cell proteins. Agricultural Microbiology, microorganisms as biofertilizers, Role of microbes in sewage disposal- waste treatment. Food microbiology: Role of microbes in food preservation, Pasteurization

Module-4 Plant pathology- Plant diseases **16 hrs**

Introduction, Concepts of plant disease, pathogen, causative agents, symptoms, Classification of plant diseases on the basis of causative organisms and symptoms, Host-Parasite interactions, Transmission and dissemination of diseases, disease cycle and control measures. Plant diseases: (Name of disease, pathogen, symptom and control measures need to be studied.) 1.Citrus Canker 2. Mahali disease of Arecanut, 3. Grey leaf spot of coconut, 5. Mosaic disease of Tapioca, 6. Bunchy top of Banana, 7. Quick wilt of pepper, 8. Rhizome rot of ginger, 9. Abnormal leaf fall of rubber, 10. Root wilt of coconut, 11. Nematode infection on Banana.

Module-5 Etiology and Control measures **10 hrs**

Prophylatic methods, Chemical, biological and genetic methods, quarantine measures. Brief account of the following fungicides –Bordeaux mixture, Bordeaux paste, Tobacco decoction, Neem cake and oil Bio pesticides (Brief account)

References

1. Dubay R.C. & D.K. Maheswari 2000. A Textbook of Microbiology, Chand & Co, New Delhi.
2. Frazier W.C. 1998. Food Microbiology, Prentice Hall of India, Pvt. Ltd.
3. Kumar H.D. & S. Kumar. 1998. Modern Concepts of Microbiology Tata McGraw Hill, Delhi.

4. Pelzar M.J., E.C.S. Chan & N.R. Kreig. 1986. Microbiology McGraw Hill, New York.
5. Rangaswami, R & C.K.J. Paniker. 1998. Textbook of Microbiology, Orient Longman.
6. Ross, F.C. 1983. Introductory Microbiology. Charles E. Merill Publishing Company.
7. Sharma P.D., 2004. Microbiology and Plant Pathology Rastogi Publication.
8. Agros, G.N. 1997. Plant Pathology (4_{th} ed) Academic Press.
9. Bilgrami K.H. & H.C. Dube. 1976. A textbook of Modern Plant Pathology. International Book Distributing Co. Lucknow.
10. Mehrotra, R.S. 1980. Plant Pathology – TMH, New Delhi
11. Pandey, B.P. 1999. Plant Pathology. Pathogen and Plant diseases. Chand & Co. New Delhi.
12. Rangaswami, G. 1999. Disease of Crop plants of India Prentice Hall of India Pvt. Ltd.
13. Sharma P.D. 2004. Plant Pathology Rastogi Publishers.

PRACTICALS **Total Hours-36 Hrs**

2 hrs/Wk

1) Micropreparation and identification of Nostoc.
2) Streak plate method.(Demonstration only)
3) Gram staining.
4) Identify TMV, HIV and Bacteriophages from the photographs
5) Collection and Identification of the disease, pathogen, symptoms and control measures of the following:
   a) Citrus canker
   b) Mahali disease
   c) Tapioca mosaic disease
   d). Abnormal leaf fall of Rubber
7). Students should be trained to prepare the fungicide Bordeaux mixture and Tobacco decoction.

Reg. No.:……

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V Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE - 5B07BOT/PLS-MICROBIOLOGY AND PLANT PATHOLOGY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. A virion is a

a) Infectious nucleic acid b) Infectious virus particle c) a virus parasitic on bacteria d) a virus parasitic on algae.

2. Red rust of tea is caused by

a) Fungus b) virus c) algae d) mycoplasma

3. Infective protein particle

a) Virus b) Viroid c) Prion d) Intron

4. Damping off disease is caused by

a) Stemonitis b) Peziza c) Puccinia d) Pythium

4x1=4

Section B *(Answer any Eight)*

5. Explain Koch's postulates.
6. Briefly explain industrial uses of microbes
7. Briefly explain the mechanism of disease resistance
8. Describe the structure of Bacteriophage
9. Describe the gene transfer methods in bacteria
10. Distinguish between smut and rust
11. Explain the role of microbes in food preservation
12. Discuss Rhizosphere flora
13. Write not eon quarantine measures.
14. Give a brief account of Gram staining
15. Explain GS/GOGAT Pathway
16. Give an account of Bergey's system of bacterial classification.

8x2=16

Section C *(Answer any four)*

17. Life cycle of a fungus causing black must of wheat
18. Write about the economic importance of Virus.
19. Explain the General characters of Cyanobacteria
20. Write an account on Biochemistry of nitrogen fixation
21. Explain Host-Parasite interactions
22. Write an account four important fungicides

4x3=12

Section D *(Answer any One)*

23**.** Microbes in soil and their role.

24. Draw and label the ultrastructure of a bacterial cell. Describe the different methods of reproduction and genetic recombination in bacteria. Mention anyone medicinal, agricultural, industrial and harmful effect of bacteria.

25. Explain classification of plant diseases on the basis of causative organisms and symptoms with selected examples.

1x8=8

CORE COURSE - TheoryVII

PLANT PHYSIOLOGY AND BIOCHEMISTRY

COURSE CODE - 5B08BOT/PLS

Credit: 4 **Total hrs: 72 hrs**

4 hrs/wk

Plant Physiology

Module 1. Plant Water Relations and Mineral nutrition 15 hrs

Plant cell and Water: structure of water, Physico- chemical Properties of water, Importance of water in plant physiology, Cohesion and adhesion. Solution and suspension, colloidal system, Diffusion, DPD, Plasmolysis osmosis, osmotic pressure, concept of water potential, osmotic potential, turgor pressure, imbibition, matric potential, Mechanism of water absorption, factors affecting absorption of water, **Transpiration**: Types and process. Mechanism of guard cell movement. K+ ion mechanism. Antitranspirant, ascent of sap, Transpiration pull and cohesion of water molecules. **Mineral nutrition**: Essential elements, criteria of essentiality of elements. Macro and Micro nutrients. Specific roles, deficiency and toxicity of micro and macro elements. Uptake of mineral elements. Difference between passive uptake and active uptake. Simple and facilitated diffusion. Carriers and channels. Aquaporins. Active uptake. Carrier concept, Mechanism of mineral absorption.

Module-2. Photosynthesis and Respiration 15 hrs

Photosynthetically active radiation. Absorption of light. Fluorescence and phosphorescene. Organization of light harvesting antenna pigments, Action and absorption spectra, Red drop and Emerson enhancement effect. Two pigment systems, Photosynthetic electron transport and photophosphorylation. Photosynthetic carbon reduction cycle (PCR), RUBISCO, C3. C4, and CAM pathways. Ecological significance of C4, and CAM metabolism. Photorespiration. Law of limiting factors. Factors influencing photosynthesis**.** Tanslocation and distribution of photo assimilates. Source sink relationship. Mechanism of phloem transport. Phloem loading and unloading, pressure flow hypothesis. **Respiration:** Mechanism of respiration, Glycolysis, Overall balance sheet, Citric acid cycle: Amphibolic nature of citric acid cycle. Electron carriers, redox potential, electron carriers function as multienzyme complexes, ATP synthesis. Chemiosmotic hypothesis.

Moduel-3 Plant Growth and Development 12 hrs

The hormone concept in plants. Plant growth and development. Auxins, gibberellins, cytokinins, abscisic acid and ethylene, their physiological roles. Chemistry and biosynthesis (Brief study). Photoperiodism and vernalization. (Brief study). Plant movements. Phototropism, gravitropism. Nyctinastic and seismonatic movements. Photomorphogenesis: Phytochrome: chemistry and physiological effects. (Brief study)**.** Seed dormancy and germination. (Brief study).

Biochemistry

Module 4. Bioenergetics 10 hrs

The laws of thermodynamics, Structure and biological functions of ATP-ADP-AMP. **Enzymes**: Classification of enzyme, Endoenzymes and Exoenzymes, Constitutive and Inductive enzymes, structure of enzymes, Mechanism of Action of enzymes, Lock and Key theory, Koshland's induced fit theory, Coenzymes, Isoenzymes, Zymase and zymogen, Properties of enzymes, Classification of enzymes, Enzyme inhibition, factors affecting enzyme activity.

Module 5. **Biomolecules** **20 hrs**

Carbohydrates: Classification- Monosacharides, Oligosacharides and Polysacharides. Open chain and ring forms of monosacharides. **Lipids** (Fat): Classification. Complex lipids, Simple lipids. Storage and structural lipids, Fatty acids saturated and unsaturated, triacyl glycerols, phospholipids, sphingolipids. Lipids in membranes. **Amino acids, peptides and proteins**: Amino acids: classification based on polarity; properties, zwitterions, acid base properties. Proteins: Classification based on function and physical and chemical properties. Covalent structure of proteins. Three dimensional structures of proteins. Primary, secondary, tertiary and quarternry structures of proteins. Weak interactions. Denaturation and renaturation. **Nucleotide and Nucleic acid**: structure of nucleotides. Purine and pyrimidine derivative in nucleotides. Functions of nucleotides and nucleotide derivatives (NAD+ , NADP + , FAD, FMN, cyclic AMP, cyclic GMP). **Secondary metabolites**: A brief survey of secondary metabolites, physiological roles.

References

1. William G. Hopkins,(1999). Introduction to Plant Physiology, 2nd edition, John Wiley A Sons, Inc.
2. Lincoln Taiz and Eduardo Zeiger (2002). Plant Physiology 2nd edition. Sinauer Associates, Inc.Publishers. Sunderland, Massachusetts.
3. Frank B. Salisbury and Cleon W. Ross (2002). Plant Physiology 3rd edition. CBS publishers and distributers.
4. G. Ray Noggle and George J.Fritz Introductory Plant Physiology Prentice Hall.
5. Goodwin Y.W., and Mercer E.I. (2003) Introduction to Plant Biochemistry. 2nd edition. CBS Publishers and distributors.
6. David I. Nelson and Michael M. Cox (2000). Lehninger. Principles of biochemistry, 3rdedition, Macmillan U.K.
7. Geoffrey Zubay Biochemistry Macmillan Publishing Company, Newyork.
8. Trevor Palmer. Enzymes- Biochemistry, Biotechnology and Clinical Chemistry. Norwood Publishing, Chichester.
9. Donald Voet and Judith Voet. (2004). Biochemistry. 3rd edition. Wiley international edition.

PRACTICALS **Total Hours-54 Hrs**

3 hrs/Wk

1. Determination of water potential by tissue weight change method.
2. Study of stomatal index.
3. Relation between water absorption and transpiration.
4. Demonstration of Hill reaction.
5. Extraction and Separation of leaf pigments by paper chromatography
6. Effects of light intensity on photosynthesis by Wilmot's bubbler.
7. Photomorphogenesis in seedlings grown under normal light and darkness.
8. Testing of seed viability by 2,3,5-triphenyl tetrazoliumchloride test.
9. Demonstration of gravitropism using Klinostat.
10. Determination of the rate of transpiration using Ganong's photometer.
11. Kuhnes fermentation experiment
13. Respirometer experiment
14. Simple respirometer

15. Qualitative tests for monosaccharides, and reducing non reducing oligosaccharides, starch, amino acids and protein.

a. Molisch's test for all carbohydrates
b. Benedict's test for reducing sugars
c. Barfoed's test for monosaccharides
d. Seliwanoff's test for ketoses
e. Iodine test for starch
f. Ninhydrin test for amino acids and protein

17. Quantitative estimation of protein by Biuret/Lowry method (Protein/Carbohydrate)

Reg. No.:……
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V Semester B.Sc. Degree Examinations
BOTANY (Core)
COURSE CODE - 5B08BOT/PLS-PLANT PHYSIOLOGY AND BIOCHEMISTRY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. Root hairs absorb water when:
   a) They respire rapidly b) Soil solution is isotonic c) Salt concentration of cell sap is high d) Salt concentration of soil is high
2. Which of the following convert the ammonia to nitrates?
   a) Nitrosomonas b) Nitrococcus c) Nitrobacter d) both (a) and (b)
3. Which of the following wavelengths is active in view of photosynthesis?
   c) 400-500nm b) 400-700nm c) 200-450nm d) 510-600nm
4. Synthesis of ATP in mitochondria requires:
   a) NADP b) FMN c) Oxygen d) Pyruvic acid

4x1=4

Section B *(Answer any Eight)*

5. Differentiate between Endoenzymes and exoenzymes.
6. What is electron transport?
7. Differentiate between Anabolism and Catabolism.
8. What are complex lipids?
9. What is Lock and Key theory?
10. What is Phototropism?
11. What is Beta oxidation?
12. Define CAM.
13. Glycolysis is also called EMP pathway,Why?
14. What is the structural difference between Chlorophyll *a* and Chlorophyll *b*?
15. What does CAN stands for?
16. What is Arc Auxanometer?

8x2=16

Section C *(Answer any four)*

17. Why is turgidity of cells essential for plants?
18. Describe the various energy carriers during photosynthesis.
19. Explain the physiological role of Auxins.
20. Explain the biological functions of ATP, ADP and AMP.
21. Describe the three dimensional structure of proteins.
22. What are the differences between Aerobic and Anaerobic Respiration?

4x3=12

Section D *(Answer any One)*

23. Give a short account of photosynthesis under the following heads
    i) Path of Carbon ii) Emerson Effect iii) Two photo system iv) Red drop
24. Describe the structure of nucleotides. What are the functions of nucleotides and nucleotide derivatives?
25. How do green plants absorb nitrogen from their environment? Describe the process involved in the conversion of absorbed nitrogen into protoplasm.

1x8=8

CORE COURSE – Theory VIII

BIOINFORMATICS, INSTRUMENTATION AND RESEARCH METHODOLOGY

COURSE CODE - 5B09BOT/PLS

Credit – 3 **Total Hrs – 54 Hrs**
3hrs/Wk

Module 1 - Overview of Information Technology **4 Hrs**

Features of the modern personal computer and peripherals, computer networks and Internet, wireless technology, cellular wireless networks. Overview of Operating Systems & major application softwares.

Module 2 - Knowledge Skills for Higher Education **4 Hrs**

Data, information and knowledge, knowledge management- Internet access methods – Dialup, DSL, Cable, ISDN, Wi-Fi. Significance of internet - a knowledge repository, a tool for academic search, communication and publishing. IT in teaching and learning, educational softwares, academic services-INFLIBNET, NICNET.

Module 3 - IT Applications **4 Hrs**

e-Governance applications at national and state level, Overview of IT application in medicine, healthcare, business, commerce, industry, defense, law, crime detection, publishing, communication, resource management, weather forecasting, education, film and media. IT in service of disabled, futuristic IT- Artificial Intelligence, Virtual Reality, Bio- Computing.

Module 4 - Social Informatics **4 Hrs**

IT & Society- issues and concerns- digital divide, IT & development, the free software movement , IT industry: new opportunities and new threats, software piracy, cyber ethics, cyber crime, cyber threats, cyber security, privacy issues, cyber laws, cyber addictions, information overload, health issues- guide lines for proper usage of computers, internet and mobile phones. e-wastes and green computing. Impact of IT on language & culture.

Module 5 -Bioinformatics **12 Hrs**

Bioinformatics -Introduction, scope and fields of application. **Major databases in Bioinformatics:** Nucleotide sequence databases –EMBL, DDBJ, Genbank; Protein sequence databases-Swiss Prot, PIR. Database Search Engines- Entrez at NCBI of USA, SRS at EBI of England. Sequence Similarity Search: Pair wise sequence alignment- BLAST, FASTA; Multiple sequence alignment – CLUSTAL W, CLUSTAL X. Phylogenetic analysis – PHYLIP. Homology modelling of protein, structure prediction- Protein Data Bank. Similarity search. Microarrays, Proteomics, Genomics, Metabolomics and Applications of bioinformatics.

Module 6- Research Methodology **6 Hrs**

History of Science, Types of knowledge- scientific knowledge, The concepts of knowledge-Information. Hypotheses, theories and laws in science, Areas of science-pure and applied science. **Experimentation in Science-**Selecting a problem, observation, data collection and interpretation; formation of hypothesis; Experimental designs- variables- correlation and causality, sampling, control in experiments, experimental bias and errors. Types of Experiments -to test a hypothesis-to measure a variable or to gather data. Making observations -direct and indirect; controlled and uncontrolled; human and machine observations. Documentation of experiments. Discussion and analysis. Publications in Science. Importance of Peer Review.

Module 7 - Instrumentation **20 Hrs**

Methods in Cell Biology-Microscopy and Microtechnique

Microscopy- History, compound microscope- the instrument. The optics of the instrument magnification, resolution. - objective lenses- ocular lens- aberration of lenses-visibility. Phase contrast microscopy, Fluorescence microscopy-video microscopy and image processing-photomicrography, Electron microscopes-SEM, TEM. Camera lucida drawing, Micrometry. **Methods in Molecular biology and Biochemistry.** Sterilisation methods - Autoclave, Laminar air flow, UV irradiation, Chemical sterilization, Centrifugation, Principles and methods, Fractionation of a cell's contents, differential centrifugation, Density gradient centrifugation. Instrumentation and principle of Homogenization and Ultrasonicator: Separation techniques- Centrifuge, Chromatography and Electrophoresis. **Spectrophotometry** –Principles, instrumentation-Colorimeter and Spectrophotometer Applications. Radioisotope techniques in biochemistry-autoradiography. Histochemistry- methods: Buffers- their principle and functions in biological systems, Preparation and uses of buffers in biological research, pH meter.

PRACTICALS

1. Parts of Compound microscope.
2. Separation of Plant pigments by paper chromatography
3. Preparation of buffers (Phosphate buffer) and determination of pH
4. Demonstration of Autoclave, Spectrophotometer, Laminar Air Flow cabinet, Centrifuge and Electrophoresis.
5. Computer hardware
6. Multiple alignment using CLUSTAL W, BLAST, PDB search and PHYLIP

References:

1. Alan Evans, Kendal Martin *et al., Technology in Action*, Pearson Prentice Hall (3rd edn.).
2. Alexis Leon & Mathews Leon, *Computers Today*, Leon Vikas.
3. Alexis & Mathews Leon, *Fundamentals of Information Technology*, Leon Vikas
4. Bajpai, P.K. (2008). *Biological instrumentation and methodology*, S. Chand and company Ltd, .New Delhi
5. Barbara Wilson, *Information Technology*: The Basics, Thomson Learning.
6. Casey E. J. - *Biophysics – Concepts and Mechanics* Van Nostrand Reinhold Company.
7. Galen .W. Ewing - *Instrumental methods of chemical analysis* Mc - Graw Hill Book Company.
8. Pranab Kumar Banerjee (2008). *Introduction to biophysics*. S.Chand and company Ltd, New Delhi.
9. Prasad and Prasad (1972) *Outlines of Botanical Micro technique*, Emkay publishers, New Delhi
10. Raven, PH; Johnson, GB; Losos, JB; Singer, SR (2005), *Biology, seventh edition*, TataMcGraw-Hill, New Delhi
11. Sass, J .E (1965). *Botanical Micro technique*
12. Parthasarathy, S.(2008), *Essentials of Programming in C for Life Sciences,* Ane Books, India, New Delhi.
13. Peter Norton, *Introduction to Computers,* 6th edn., (Indian Adapted Edition).
14. Rajaraman,V. *Fundamentals of Computers* (Printice Hall of India Pvt. Ltd)
15. Rajaraman,V. *Introduction to Information Technology*, Prentice Hall.
16. Ramesh Bangia, *Learning Computer Fundamentals*, Khanna Book Publishers
17. Röbbe Wünschiers 2004, *Computational Biology- Unix/ Linux, Data processing and programming*, Springer-Verlag, New Delhi.
18. Sinha, P.K. *Computer fundamentals* (BPB Publications)
19. Vijaya lakshmi & Pai & Rajasekar Nair, *Neural network*.
20. Wunschiers, R. *Computational Biology* (Springer)
21. Jin Xiong. 2009. Essential Bioinformatics. Cambridge University Press.
22. Attwood AT and DJ Parry-smith. Introduction to Bioinformatics. Pearson Education Ltd.

Web resources:

www.fgcu.edu/support/office2000

www.openoffice.org Open Office Official web site
www.microsoft.com/office MS Office web site
www.lgta.org Office on-line lessons
www.learnthenet.com Web Primer
www.computer.org/history/timeline
www.computerhistory.org
http://computer.howstuffworks.com
www.keralaitmission.org
www.technopark.org
http://ezinearticles.com
http://www.scribd.com/doc/259538/All-about-mobile-phones
http://www.studentworkzone.com/question.php?ID=96
http://www.oftc.usyd.edu.au/edweb/revolution/history/mobile2.html

Reg. No.:……

Name:……

V Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE - 5B09BOT/PLS - BIOINFORMATICS, INSTRUMENTATION AND RESEARCH METHODOLOGY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

66. Educational soft ware
    a) BLAST b) PHYLIP c) INFLIBNET d) none
67. Chromatography is a
    a) Separation technique b) Kind of Microscope c) Information Technology d) All the above
68. Which of the following is not used in sterilization
    d) UV b) Mercuric Chloride c) Laminar air flow cabinet d) Electrophoresis
69. Data retrieval tool
    a) FASTA b) Cyber security c) Entrez d) Operating sysyem

4x1=4

Section B *(Answer any Eight)*

70. Define genomics and proteomics.
71. What is electrophoresis?.
72. Comment on virtual reality and its applications?
73. Differentiate between SEM and TEM.
74. Describe e-waste management?
75. Write a note on PDB and its application.
76. What are buffers? Explain its application in biological research.
77. Describe autoradiography.
78. What is a scientific hypothesis? Explain.
79. Write a note on cyber security?
80. Comment on IT and information over load.
81. Describe an operating system.

8x2=16

Section C *(Answer any four)*

82. Explain sequence alignment tools and its applications.
83. What is centrifugation? Explain its applications.
84. Comment on e-governance and its applications?
85. Explain the methods of designing a scientific experiment.
86. Describe the principles of spectrophotometry.
87. What is phylogeny? Explain analysis using PHYLIP.

4x3=12

Section D *(Answer any One)*

88. Comment on biological databases, data retrieval systems and its applications.
89. Discuss the applications of information technology in medicine, healthcare, commerce and education.
90. Explain the various parts of a compound light microscope and its optics of magnification.

1x8=8

CORE COURSE – Theory IX

PLANT TISSUE CULTURE, EMBRYOLOGY AND PALYNOLOGY

COURSE CODE - 6B10BOT/PLS

Credit – 3 **Total Hrs – 54 Hrs**

3hrs/Wk

Module-1 **12 hrs**

Plant Tissue Culture-History, Principle–Totipotency, differentiation, dedifferentiation, redifferentiation. Tissue culture laboratory requirements, Media – MS medium composition, Preparation, Sterilization techniques, Explant-selection, sterilization, inoculation and incubation.

Module-2 **12 hrs**

Types of culture – Meristem culture, Organ culture, Callus culture, Cell suspension culture, Protoplast culture, Isolation of protoplasts, Somatic hybridization and its significance, Somatic hybrids and cybrids, Somatic embryogenesis and synthetic seeds. Haploid production – Androgenic and Gynogenic.

Module-3 **10 hrs**

Tissue culture applications and achievements - Somaclonal variation and advantages, Production of disease free plants, Production of secondary metabolites in Bioreactors. Application of tissue culture in Biodiversity conservation.

Module-4 **20 hrs**

Embryology - Introduction and Historical account of Embryology. Structure and functions of Microsporangium and wall layers. Microsporogenesis and development of male gametophyte Megasporogenesis and development of female gametophyte (Polygonum, Allium and Peperomia). Types of ovules, Fertilization. Endosperm – structure, development and types (Nuclear, Cellular, Helobial, Special type – Ruminate). Embryo – Structure and development of Dicot embryo (Capsella type), Monocot embryo (Najas). Polyembryony-Classification and Significance, Apomixis, Agamospermy- apospory and parthenocarpy. **Palynology -** Pollen structure and Morphology, Acetolysis of pollen grain. Economic importance, Pollen allergy.

References

1. Dubey, R.C (2001): A text book of Biotechnology.
2. Maheswari , P. - *Embryology of Angiosperms* - Vikas Pub:
3. Nair P .K .K - *Pollen Morphology of Angiosperms* - Scholar Publishing House, Lucknow
4. Saxena M. R. – *Palynology – A treatise* - Oxford & I. B .H., New Delhi.
5. Singh, B.D (2003) Biotechnology :Kalyani Publishers, New Delhi..
6. John .E.Smith(2004):Biotechnology:Cambridge university press.
7. Chawla.H.S(2003) Laboratory Manual for plant Biotechnology;oxzford and IBH

PRACTICALS **Total Hours-54 Hrs**

3 hrs/Wk

1. Preparation of the medium, sterilization of explant and Production of callus
2. T.S of mature anther
3. Dicot embryo
4. Monocot embryo.
5. Acetolysis
6. Visit to tissue culture laboratory

Reg. No.:……

Name:……

VI Semester B.Sc. Degree Examinations.

BOTANY (Core)

CORE COURSE - IX

COURSE CODE - 6B10BOT/PLS

PLANT TISSUE CULTURE, EMBRYOLOGY AND PALYNOLOGY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. Most common type of ovule is
   a) Anatropous b) Orthotropous c) Amphitropous d) Camphylotropous
2. Which of the following is not an auxin
   e) IAA b) NAA c) IBA d) BAP
3. The out most layer of pollengrain is
   a) Exine b) Intine c) Epidermis d) Tapetum
4. Unorganized mass of tissue is called
   a) Callus b) Meristem c) Somatic embryos d) Embryo

4x1=4

Section B *(Answer any Eight)*

5. Define polyembryony and is significance
6. What are synthetic seeds?
7. Explain totipotency.
8. Differentiate dedifferentiation and redifferentiation.
9. Discuss the economic importance of pollengrains.
10. Distinguish between a hybrid and a cybrid.
11. What is parthenocarpy?
12. Describe the structure of microsporangium.
13. What is double fertilization?
14. What is suspension culture?
15. Briefly describe a tissue culture media.
16. Draw a labeled diagram of dicot embryo.

8x2=16

Section C *(Answer any four)*

17. Explain the significances of apomixis
18. Write a note on in vitro production of secondary metabolites.
19. What is an endosperm? Explain its role and significance.
20. Explain the importance of sterilization in tissue culture
21. Give an account on pollen morphology.
22. Describe the somaclonal variants and their significance.

4x3=12

Section D *(Answer any One)*

23. Give an account on protoplast culture and its significance.
24. Explain the production and significance of haploid plants.
25. Describe the megasporogenesis and development of female gametophyte

1x8=8

CORE COURSE – Theory X

GENETICS, BIOSTATISTICS AND EVOLUTION

COURSE CODE - 6B11BOT/PLS

Credit – 4 **Total Hrs – 72 Hrs**
4hrs/Wk

Module-1 Introduction: 6Hrs

Definition, branches-classical and modern (molecular and evolutionary) genetics**.** History-Pre historic times- Before1860; 1860-1900; 1900-1944; 1944-present. Basic concepts and terms in genetics: Alleles, homozygous and heterozygous, hemizygous, traits, phenotypes, genotypes, genes, locus, linkage, mutation; population. Test cross, back cross, reciprocal cross. Genes Vs Environment. Scope of genetics. Genetics and society- Eugenics and Euphenics;

Module 2- Mendelism: 6 Hrs

Mendel- a brief biography and experiments. Laws of Mendel. Impacts of Mendelism in science and society. Rediscovery of Mendel. Mendel's experiments-law of segregation and independent assortment of characters. Mendelian Genetics and sexual cycle in plants ; Mendelian principles and human genetics.

Statistical Probability and Mendelian genetics-Hypothesis testing-Chi-square test. Pedigree analysis- Symbols of Pedigree- Pedigrees of Sex-linked & Autosomal (dominant & recessive)

Module 3- Gene interactions 12 Hrs

Allelic interactions-co dominance and incomplete dominance-Multiple Alleles-albino Series in Rabbits-ABO Blood group in man-Self Sterility in tobacco; Lethal alleles-Coat color in mice-albinism in corn; **Non allelic interaction**-Comb pattern in fowls-(9:3:3:1);

Epistasis- Coat color in mice 9:3:4-Fruit colour in summer squashes-12:3:1; complementary genes Flower color in lathyrus-9:7-Inhibitory factor-leaf color in paddy-13:3; Duplicate genes-shepherd's purse-15:1-duplicate genes with cumulative effect-9:6:1: Pleotropic genes

Quantitative inheritance- Polygenes-General Characters- Quantitative inheritance in human beings-skin colour,IQ and other traits.Ear size in corn.Transgressive variation-Heritability-Phenotypic expression-penetrance and expressivity

Module-4 - Chromosome mapping 5 Hrs

Linkage: Definition; types – complete (drosophila) and incomplete(maize); explanations for linkage- Linkage V**s** Independent assortment. crossing over-Mechanism of crossing over-cytological demonstration.

Chromosome Mapping-definition- determining the gene sequence - importance of Two point and three point test crosses in chromosome mapping-Interference and coincidence-

Module 5 - Sex linked inheritance 6 Hrs

Determination of sex- different theories- Chromosome theory (Grasshopper, Man, Drosophila); Dosage compensation; Lyon Hypothesis; Genic balance theory. Sex determination in plants (Melandrine, Dioscorea, Sphaerocarpus). Sex linked Inheritance-X linked inheritance-eye color in Drosophila-Haemophilia in man-Y-Linked inheritance-Sex limited and sex influenced traits.

Extra chromosomal inheritance-Maternal influence-Coiling of shells in snails; Pigment in flour moth; Variegation in Four o' clock plant; Poky in Neurospora.

Module 6 – Biostatistics **10 Hrs**

Biostatistics– Measures of Central tendency- Arithmetic Mean, Median, Mode; Measures of Dispersion – Range, Standard Deviation, Standard Error; Correlation and Regression, Analysis of variance ANOVA; Application of Biostatistics

Module 7- Evolutionary concepts **8hrs**

Evolution: Definition- classical and modern concepts- Macroevolution, Microevolution, Convergent Evolution, Divergent Evolution, Retrogressive Evolution. Evidences of evolution: fossil, atavism, experimental, embryological and anatomical, life history, cell structure, etc.
Species concept- different definitions: speciation- types, reasons

Module 8 Theories of evolution: **9 hrs**

Early life- biomolecules and its evolution. Oparin's bubble hypothesis; the earliest cells**.** The origin of Prokaryotes and Eukaryotes- endosymbiotic theory**.**

Lamark, Weisman and De Vries, Darwin and Wallace- Neo-Darwinism- Modern concepts of evolution.

Module 9: Evolution and Genes **5 hrs**

Mutation and Evolution- Polygenic inheritance –heritability and selection- Polyploidy and Evolution, Hybridization and Evolution, **Population Genetics-** Gene Frequencies in population, Gene pool and Gene frequencies; Equilibrium of Gene frequencies and Hardy-Weinberg law- Changes in Gene Frequencies-Mutation, selection, migration, genetic drift, non- random mating.

Module 10: Evolution and phylogeny **5 hrs**

Geological time scale and Early plant life. The main lines of plant evolution– from algae to angiosperms.

Systematics and phylogeny: Reconstructing and Using Phylogenies, Phylogenic trees based on biomolecules- amino acid sequences, Quantitative DNA measurements, Repetitive DNA sequences, restriction enzyme sites and nucleotide sequences

PRACTICLAS: **54 hrs**
3hrs/wk

GENETICS PROBLEMS

1. Dihybrid inheritance
2. Allelic and Non allelic Gene interactions.
3. Chromosome mapping (two-point and three point crosses),
4. Chi square analysis
5. Probability factor in Genetics

BIOSTATITICS

1. Work out problems on measures of central tendencies, measures of dispersion .

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16. Chamberlain C.J Gymnosperm, Structure and Evolution.
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25. Stebins G.L(1950)Variation and Evolution in plants.Columbia universty,press.Newyork
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Reg. No.:……

Name:……

VI Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE - 6B11BOT/PLS - GENETICS, BIOSTATISTICS AND EVOLUTION

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

91. ABO blood group system was discovered by
    a) de Vries b) Gregor Mendel c) Landsteiner d) Poisson
92. A man who is affected with phenylketonuria marries a woman who is heterozygous at that locus. What is the probability that their first child will have phenylketonuria?
    a)1/8 b)1/4 c)1/2 d)3/4
93. The appearance of ancestral characters in an individual is termed as
    a) Atavism b) Convergence c) Divergence d) Isolation
94. Which of the following statements about heritability are true?
    a) is a measure of level of gene linkage
    b) is a measure of inbreeding
    c) is a measure of proportion of repeated DNA in an organism
    d) is a measure of the proportion of variation that is due to genetic causes

4x1=4

Section B *(Answer any Eight)*

95. Define speciation.
96. Differentiate standard deviation from standard error.
97. Explain Genic Balance theory?
98. What are the major reasons for the genetic recombination in a plant with amphimixis?
99. Evaluate the importance of Record keeping habit in Mendel's success.
100. In a monohybrid cross, there was an appearance of a non parental phenotype in F_1 and also there was an F_2 generation with a 1:2:1 phenotypic ratio. Explain.
101. How the concept of Linkage affected the Law of Independent assortment.
102. Briefly describe the Self Sterility in *Nicotiana*.
103. Differentiate Systematics and Phylogeny.
104. What is the use of Chi square test?
105. How Multiple allelism is different from Pleiotropism?
106. Give an account on the flora of Jurassic Era.

8x2=16

Section C *(Answer any four)*

107. Explain different theories on the origin of life on earth.
108. Give an account on the applications of ANOVA.
109. Briefly describe the embryological evidences on evolution.
110. Explain Sex limited, sex influenced and sex linked characters in human beings with suitable examples.
111. Describe Hardy Weinberg Equilibrium and its application in Evolutionary biology.
112. Assume, Mendel made a trihybrid cross of two true breeding plants one with all dominant traits and the other with all recessive traits. What would be the ratio of phenotype in the F2 generation?

4x3=12

Section D *(Answer any One)*

113. How can you distinguish extra chromosomal inheritance from a case of autosomal inheritance and sex linked inheritance? Explain.
114. Describe the uses of statistical tools in biology with the help of suitable examples.
115. Write an account on Darwinism. Add a note on the demerits of Darwinism that has been answered during Neo Darwinism.

1x8=8

CORE COURSE – Theory XI
BIOTECHNOLOGY AND CROP IMPROVEMENT
COURSE CODE - 6B12BOT/PLS

Credits: 4 **Total hrs: 72**
4hrs/wk

Module-1-Gene Manipulation **30 hrs**

Introduction–History and Emergence of Biotechnology**.** Fundamentals of Gene Manipulation-Recombinant DNA Techniques, Restriction Endonucleases, Ligases and DNA modifying Enzymes, **Vectors**-Cloning and expression vectors**,** Different types**,** Plasmids, Virus as vectors, Artificial vectors, Binary Vectors and Shuttle vectors. **Transformation**-Getting DNA into cells; Methods; Physical, Chemical and Biological. Role of *Agrobacterium* in plant transformation**,** Ti and Ri plasmids. **Selection of Recombinants-**Selection markers**,** Replica plating and Colony hybridization, Insertional inactivation, direct selection (GFP), Blue-white colony selection. **Gene Isolation**-Gene mapping, DNA Finger Printing (RFLP, RAPD and SSR), Gene library-Genomic library and cDNA library. Polymerase Chain Reaction. **Gene sequencing-**Maxam Gilbert's method and Sanger's method.

Module-2- Nano biotechnology **10 hrs**

Introduction-Basics of Nanobiotechnology, Background and history, scope and significance of nanotechnology. Nanosystems in nature. Nanoscaled bio-molecules (nucleic acids and proteins). Nanoparticles. Applications of nanotechnology in life sciences-DNA micro array and biosensors. Disease diagnosis, drug delivery, drug targeting and as drug, tissue culture and tissue engineering.

Module-3-Gene Manipulation and Bio-ethics **12 hrs**

Biotechnology current status in India- Major research Institutes (an over view). Bioethics-Global vs Indian Scenario, Regulatory authorities in India. Food safety and GMOs-Agri products and Business, Bt cotton, Golden rice, Terminator gene techniques, long shelf life, vaccines and drugs; advantages and disadvantages. Gene therapy and DNA fingerprinting social issues. Patenting Life forms-Biotechnology and the Patents.

Module-4- Plant breeding and Crop Improvement **20 hrs**

Plant breeding-History and objectives of Plant Breeding. Genetic resources-Centres of diversity, Origin of crop plants, Domestication, Conservation, Plant introduction and acclimatization. Methods of Breeding-Budding, Layering, Grafting, Hydridization-Heterosis and Selection, (Pedigree, Mass, Pureline and Clonal). Haploidy, Polyploidy breeding and Mutation breeding and its achievements. Major plant breeding Instititutes in India and its contributions. Plant variety protection, Farmer's right and plant breeders rights. Plant quarantine measures. **Biotechnology and Crop improvement:** Pest Resistance, Herbicide Resistance, Drought resistance, Enrichment of storage protein and Improvement of the nutritional quality. Applications of Biotechnology-Healthcare/Pharma, Industrial, Agricultural and Environmental.

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39. Allard RW., 1960. Principles of plant breeding, John Wilson and Sons
40. Bajaj VPS 1990. Haploids in crop improvement.

PRACTICALS **Total Hours-18 Hrs**

1hr/Wk

1. Plant total DNA extraction.
2. Agarose gel electrophoresis of DNA samples.
3. Polymerase Chain Reaction (demonstration only)
4. Visit to a Biotechnology lab.
5. Breeding Methods-Budding, Layering and Grafting

Reg. No.:……

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VI Semester B.Sc. Degree Examinations.

BOTANY (Core)

COURSE CODE - 6B12BOT/PLS-BIOTECHNOLOGY AND CROP IMPROVEMENT

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

1. Which of the following enzyme is not used in rec DNA synthesis.
   a) Chitinase b) Ligase c) Polymerase d) Endonuclease
2. PCR is invented by
   f) Watson and Crick b) Robert Brown c) Kary Mullis d) Linus Pauling
3. Western Ghats are centre of origin of
   b) Coconut b) Pepper c) Rice d) All
4. Golden rice is
   b) With vitamin A b) With nano particles of gold c) with high price d) Growing near goldmine.

4x1=4

Section B *(Answer any Eight)*

5. Describe replica plating.
6. What is the role of GMO regulatory authorities in India?
7. Write an account on farmers' right.
8. What are DNA finger prints?
9. Explain terminator gene technology.
10. Write note on plant quarantine measures..
11. Explain Ti and Ri plasmids?
12. What are selection markers?
13. Describe DNA micro array?
14. What is heterosis?
15. Distinguish between Polyploidy breeding and Mutation breeding.
16. What are shuttle vectors?

8x2=16

Section C *(Answer any four)*

17. What is PCR? Write note on its applications.
18. Explain the gene sequencing techniques.
19. Give an account on nanotechnology and its applications.
20. Write a note biotechnology and bio-ethics.
21. Describe *Agrobacterium* mediated plant transformation.
22. What are herbicide resistant trangenics? Explain.

4x3=12

Section D *(Answer any One)*

23. Describe different methods of plant breeding and selection.
24. What is a gene library? Explain the creation of library and its significance.
25. Explain with suitable diagrams the process of rec DNA synthesis and techniques of transformation of E. coli.

1x8=8

CORE COURSE – Theory XII
CELL AND MOLECULAR BIOLOGY
COURSE CODE - 6B13BOT/PLS

Credit: 4 **Total hrs: 72 hrs**
4 hrs/wk

CELL BIOLOGY

Module-1- The Origin of Cell **4 hrs**

Introduction to the study of cell biology - History of the Progress of cell Biology, The origin of cells and origin of life, Pre biotic formation of polypeptides, Nucleotides and Nucleic acids; Urey-Miller experiment, Evolution of Prokaryotic and Eukaryotic cells, Organization of prokaryotic and Eukaryotic cells, Development of the cell theory, Modern concepts on origin of Life.

Module-2- Eukaryotic Cell Organelles **12 hrs**

Morphological diversity of eukaryotic cells. Structure and function of the following cell organelles**: Cell wall**: Primary and Secondary wall, Structure and function, Plasmodesmata. **Plasma membrane**- Ultra structure and functions, **Cytoplasm-** Physical and biological properties **Nucleus and Nucleolus: U**ltra structure of the interphase nucleus, The nuclear envelope: Nuclear pore complex, Nucleolus: Structure and functions. **Endomembrane system-Endoplasmic reticulum**, **Golgi apparatus, Vesicles, Lysosomes;** Structure and functions. **Microbodies-Peroxisomes, glyoxysomes,** Structure, functions and significance. **Ribosomes:** Structure, Chemical nature and role in protein synthesis. **Organelles that contain DNA- Mitochondria:** Ultra structure and functions. **Chloroplasts:** Types of plastids, Ultra Structure and function. Origin of Mitochondria and Chloroplast and Significance. **Cytoskeleton:** interior framework of the cell-Actin filaments**,** microtubules, intermediate filaments- **Centrioles:** microtubule assembly, **Vacuoles:** a central storage compartment.

Module-3 Chromosomes **12 hrs**

Introduction – Role of chromosomes in inheritance and its significance. Chromosome Morphology, Chromosomal nomenclature- Chromatid, Centromere, Telomere, Secondary constriction, Satellite and Nucleolar Organizing Regions. Chromosomal classification based on position of Centormere. Heterochromatin and Euchromatin, Karyotye and Idiogram. Chromatin reticulum-Structure, Chemical organization of Chromosomes; DNA and Histones. Packaging the DNA into Chromosomes, Polytene chromosomes, Lamp brush chromosomes and B chromosomes. **Chromosome mutation - Structural aberration**. - Deletion, Duplication, Inversion and Translocation and its genetic consequences. **Numerical aberration** - Aneuploidy and Euploidy. **Human chromosomal abnormalities -** Cri-du-chat syndrome, Turner syndrome, Down's syndrome, Klinefelter syndrome.

Module 4 - Cell Division and Cell Cycle **8 hrs**

Mitosis - Prophase: formation of the mitotic apparatus, **metaphase**: alignment of the centromeres-**anaphase**: separation of the chromatids T**elophase**: reformation of the nuclei Significance of mitosis. **Cytokinesis. Meiosis – Stages of Meiosis I and II,** Genetic consequences and Significance of Meiosis. Cell Cycle – Phases, Interphase and Mitotic phase, Genetic Regulation (Brief account only) and Significance.

Molecular Biology

Module-5- Overview of molecular biology 12 hrs

Introduction: DNA- The genetic material, Discovery and history, Evidences for DNA as genetic material, (Griffith, Avery, McLeod, McCarthy Experiments and Hershey-chase experiments) Chargaff's rules. Watson and Crick model of DNA. Forms of DNA- A, B and Z form of DNA. **DNA replication**-Messelson and Stahl Experiment, Enzymology of DNA replication, Mechanism of Replication, Continuous and discontinuous, Bidirectional replication.

Concept of gene - Evolution of the gene concept, Beadle and Tatum's experiments with Neurospora, Archibald Garrod; Inborn errors in metabolism. Cistron, Recon, Muton. One gene-One enzyme hypothesis, One gene-One polypeptide hypothesis. The interrupted Gene – Introns and Exons, Overlapping Genes. **Genetic code –** Discovery (Brief account), features of genetic code, Codon and Anticodon.

Module-6-Gene Expression 12 hrs

Transcription- DNA dependent synthesis of RNA, Mechanism-.initiation, elongation and termination of RNA synthesis. Types of RNA-Structure, Composition and Significances of tRNA, mRNA and rRNA. Post transcriptional modification in eukaryotic mRNA. Comparison between prokaryotic and eukaryotic transcription. **Translation-**Protein synthesis- Mechanism -Activation of aminoacids, initiation, elongation, termination. Post translational processing (Brief account).

Module-7-Gene Regulation 6 hrs

Gene regulation in prokaryotes - Operon concept- *lac, trp, ara* operon. **Gene regulation in Eukaryotes -** Transcriptionally active and inactive form of chromatin, Molecular organization of promoters in prokaryotes and eukaryotes and role of promoters in Eukaryotic gene regulation.

Module -8-Gene Mutation 6 hrs

Types of mutation-Transition, Transversion and Frameshift mutation, Molecular basis of mutation, Mutagens; Chemical and Physical agents, tautomeric shift, alkylating agents, base analogues. DNA Repairing Mechanisms **Mobile genetic elements -** General account - Characteristics-Transposons (Tn) and insertion sequences (Is) - Basic components of bacterial Transposons, Mechanism of transposition, Retrotransposons, LINES and SINES. **Oncogenes and cancer –**Carcinogenesis, Characters of Cancer cells, Cellular oncogenes and Tumour suppressor genes

References

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29. William Hexter and Henry T.Yost, Jr.(1977) The science of Genetics.

PRACTICALS **Total Hours-18 Hrs**

1hr/Wk

1. Make acetocarmine squash preparation of onion root tips and to identify different stages of mitosis.
2. Prepare giant chromosome from Drosophila salivary gland.
3. Identification of chromosomal aberrations.

Reg. No.:……

Name:……

V Semester B.Sc. Degree Examinations.

BOTANY (Core)

CORE COURSE - XII

COURSE CODE - 6B13BOT/PLS - CELL AND MOLECULAR BIOLOGY

Time: 3 Hours **Total Marks: 40**

Section A *(Answer all)*

26. Chromosome constitution of Down's syndrome is
    a) 2A+XX b) 2A+XXY c) 2A+XY d) none
27. Chromosome with arm ratio one is;
    a) Acrocentric b) Telocentric c) Metacentric d) All the above
28. Eukaryotic ribosomes split up into
    g) 60S and 40S b) 40S and 30S c) 50S and 30S d) 60S and 30S
29. Which of the following is not a post transcriptional change
    a) mRNA Capping b) Slicing c) Poly A Tailing d) Reverse Transcription

4x1=4

Section B *(Answer any Eight)*

30. Define Autopolyploidy and Allopolyploidy with suitable examples.
31. State Chargaff's rule and its significance.
32. What is cri-du-chat syndrome?
33. What are the different forms of DNA?
34. What is the Oparin's idea concerning the origin of life?
35. What are Oncogene and tumour suppressing genes?
36. What are the difference between Paracentric and Pericentric inversion.
37. Describe the general structure of nucleotide.
38. Differentiate Telomere and Centromere.
39. What are B-chromosomes?
40. Write short note on genetic code
41. Explain cytoskeleton.

8x2=16

Section C *(Answer any four)*

42. Explain the structure and functions of DNA.
43. Describe the interphase nucleus and cell cycle.
44. What are the differences in the transcription in prokaryotes and eukaryotes?
45. Explain the structure of mitochondria and comment on its origin.
46. Describe polytene chromosomes and lamp brush chromosomes.
47. Write short note on transposons.

4x3=12

Section D *(Answer any One)*

48. Draw the fluid mosaic model of plasma membrane and discuss different views on its structure and functions.
49. Describe the translational process in eukaryotes.
50. Write an account on DNA replication and enzymes involved.

1x8=8

CORE COURSE – PRACTICAL-II
COURSE CODE-6B14BOT/PLS

TAXONOMY , MORPHOLOGY AND ECONOMIC BOTANY

PRACTICALS **Total Hours-72 Hrs**

1. Study of taxonomic features and economic importance of representative members of the following families: Annonaceae, Nymphaeaceae, Malvaceae, Rutaceae, Anacardiaceae, Papilionaceae, Caesalpiniaceae, Mimosaceae, Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae Acanthaceae, Verbenaceae, Lamiaceae, Euphorbiaceae, Amarantaceae, Orchidaceae ,Zingiberaceae, Liliaceae, Arecaceae, Poaceae

2. Construction of dichotomous keys for the easy identification of members of the family Papilionaceae, Rubiaceae and Euphorbiaceae.- demonstration only.

3. A minimum of 20 herbarium specimens representing the prescribed families with field notes on at least 50 plants collected including any common local plants.

4. Identification of herbarium specimens and local plants.

5. Field trip to learn the plant diversity and characteristics of plant families under the supervision of teachers.

MORPHOLOGY

1. Identify with a note the different types of inflorescence, fruits and placentations.

2. Different mechanisms of fruit and seed dispersal

ECONOMIC BOTANY

Study of the Botanical name, Family, Morphology of useful parts and Utility of the following:

1. **Cereals and millets** Rice, Wheat, Maize, Ragi, Jowar, Bajra:
2. **Pulses**- Bengal gram, Black gram, Green gram, Red gram, Cow pea:
3. **Fruits and Vegetables**-Banana, Jackfruit, Pineapple, Water melon, Tomato, Brinjal, Pumpkin, Cucumber, Snake gourd, Bitter gourd:
4. **Spices and condiments**-Cinnamon, Clove, Cardamom, Nutmeg, Pepper.
5. **Sugar-yielding** plant- Sugarcane:
6. **Tuber crops** - Tapioca, *Amorphophallus* and *Colocasia*:
7. **Fibre yielding** – Cotton, Coir, Jute:
8. **Dyes** - Indigo, Henna:
9. **Latex yielding** - Para rubber:
10. **Oil yielding** - Sesame oil, Palm oil, mustard oil, Coconut oil:
11. **Beverages**-Tea, Coffee, Cocoa:
12. **Medicinal plants**- *Gymnema sylvestre, Scoparia dulcis, Phyllanthus amarus, Saraca indica, Bacopa monnieri, Justicia adhatoda, Catharanthus roseus* and *Rauvolfia serpentina*.

MICROBIOLOGY AND PLANT PATHOLOGY

PRACTICALS **Total Hours-36 Hrs**

2 hrs/Wk

1) Micropreparation and identification of Nostoc.
2) Streak plate method.(Demonstration only)
3) Gram staining.
4) Identify TMV, HIV and Bacteriophages from the photographs
5) Collection and Identification of the disease, pathogen, symptoms and control measures of the following:
    a) Citrus canker
    b) Mahali disease
    c) Tapioca mosaic disease
    d). Abnormal leaf fall of Rubber
7). Students should be trained to prepare the fungicide Bordeaux mixture and Tobacco decoction.

PLANT PHYSIOLOGY AND BIOCHEMISTRY

PRACTICALS **Total Hours-54 Hrs**

1. Determination of water potential by tissue weight change method.
2. Study of stomatal index.
3. Relation between water absorption and transpiration.
4. Demonstration of Hill reaction.
5. Extraction and Separation of leaf pigments by paper chromatography
6. Effects of light intensity on photosynthesis by Wilmot's bubbler.
7. Photomorphogenesis in seedlings grown under normal light and darkness.
8. Testing of seed viability by 2,3,5-triphenyl tetrazoliumchloride test.
9.Demonstration of gravitropism using Klinostat.
10.Determination of the rate of transpiration using Ganong's photometer.
11. Kuhnes fermentation experiment
13. Respirometer experiment
14. Simple respirometer
15. Qualitative tests for monosaccharides, and reducing non reducing oligosaccharides, starch, amino acids and protein.
    a. Molisch's test for all carbohydrates
    b. Benedict's test for reducing sugars
    c. Barfoed's test for monosaccharides
    d. Seliwanoff's test for ketoses
    e. Iodine test for starch
    f. Ninhydrin test for amino acids and protein
17. Quantitative estimation of protein by Biuret/Lowry method (Protein/Carbohydrate)

MODEL QUESTION PAPER

CORE PRACTICAL -II

Courses of semester V

Taxonomy, Morphology and Economic botany
Microbiology and Plant Pathology
Plant Physiology and Biochemistry
Bioinformatics, Biophysics and Research Methodology

Time 3Hr Max. marks 60

1. Describe the given specimen A in technical terms,classify the given specimen to its respective family giving reasons
   Description-4 family-1 reasons-2 (7 marks)
2. Take a V.S. of flower B draw labeled diagram, construct floral diagram, floral formula leave the preparation for valuation
   Section -1 diagram-2 floral diagram -2 F.F.-1 (6 marks)
3. Perform Gram staining of bacterial solution C, show the result, write the procedure
   Preparation-2 Procedure -2 (4marks)
4. Identify the disease, name of pathogen and give symptoms and control measures on material D
   Disease- 1 Pathogen-1 Symptoms and control measures-2 (4marks)
5. Determine the presence of…….from the given sample E and write down the procedure
   Experiment -2 Result-1 Procedure-2 (5marks)
6. Physiology experiment Write aim, Procedure, precautions and labeled diagram of F
   Aim and procedure-2, Diagram- 2, Precautions – 1 (5marks)
7. Write critical notes on G (3marks)
8. Give botanical name, family and morphology of useful part H and I
   B.N-1 Family-1 Morphology and uses-2 (4x2= 8marks)
9. Campus plants J and K (2x2=4marks)
10. Herbarium L and M (2x2-4marks)
11. Write critical notes on N,O and P (2x3=6marks)
12. Spot at sight Q,R,S and T (1x4=4marks)

Key to the specimens

1 Taxonomy 2) Taxonomy 3) Bacterial solution 4) Pathology material 5) Test solution 6) Physiology expt.7) Morphology 8) Economic Botany 9) Campus plant from the syllabus only10) Herbarium 11) Biophysics, Physiology, Biochemistry12) Bioinformatics, Biophysics, Physiology and Biochemistry

CORE COURSE – PRACTICAL-III
COURSE CODE-6B15BOT/PLS
Total -144 hrs

PRACTICALS **-54 Hrs**

PLANT TISSUE CULTURE, EMBRYOLOGY AND PALYNOLOGY

7. Preparation of the medium, sterilization of explant and Production of callus
8. T.S of mature anther
9. Dicot embryo
10. Monocot embryo.
11. Acetolysis
12. Visit to tissue culture laboratory

GENETICS, BIOSTATISTICS AND EVOLUTION

PRACTICLAS: **-54 hrs**

GENETICS PROBLEMS
1. Dihybrid inheritance
2. Allelic and Non allelic Gene interactions.
3. Chromosome mapping (two-point and three point crosses),
4. Chi square analysis
5. Probability factor in Genetics

BIOSTATITICS
1. Work out problems on measures of central tendencies, measures of dispersion.

BIOTECHNOLOGY AND CROP IMPROVEMENT

PRACTICALS **-18 Hrs**

51. Plant total DNA extraction.
52. Agarose gel electrophoresis of DNA samples.
53. Polymerase Chain Reaction (demonstration only)
54. Visit to a Biotechnology lab.
55. Breeding Methods-Budding, Layering and Grafting

CELL AND MOLECULAR BIOLOGY

PRACTICALS -18 Hrs

4. Make acetocarmine squash preparation of onion root tips and to identify different stages of mitosis.
5. Prepare giant chromosome from Drosophila salivary gland.
6. Identification of chromosomal aberrations.

CORE PRACTICAL -III

Courses of semester V1

Plant Tissue culture, Embryology and Palynology

Genetics, Biostatitics and Evolution

Biotechnology and Crop improvement

Cell and Molecular Biology

Time-3Hrs Max. marks-60

1. Work out the problem A 9 marks
2. Work out the problem B 6 marks
3. Work out the problem 5 marks
4. Prepare an acetocarmine squash of material D identify two clear stages of mitotic division with reasons, draw a labeled diagram of each stage and report for valuation
   Preparation-2 Identification-1 Reason-2 Diagram-1 12 marks

5. Dissect out embryo F 5 marks
6. Anther G 4 marks

Write Notes on

7. Grafting/layering,
   Identification-1 Procedure-4 5 marks
8. Chromosomal aberration 5marks
9. Spotters (Biotech 2, Tissue culture2, Crop improvement1 marks 3x3

OPEN COURSE

1. MUSHROOM CULTIVATION AND MARKETING

Course code - 5D01BOT/PLS

Contact Hours- 36 **Credit- 2**

Module I

History and introduction. Edible mushrooms and Poisonous mushrooms. Systematic position, morphology, distribution, structure and life cycle of *Agaricus* and *Pleurotus*.

8 Hours

Module II

Nutritional value, medicinal value and advantages- types- milky, straw, button and poisonous mushrooms **6** Hours

Module III

Cultivation: Paddy straw mushroom – substrate, spawn making. Methods – bed method, polythene bag method, field cultivation. Oyster mushroom cultivation –Substrate, spawning, pre-treatment of substrate. Maintenance of mushroom. Cultivation of white button mushroom – Spawn, composting, spawning, harvesting. **10** Hours

Module IV

Diseases- Common pests, disease prevention and control measures. Processing - Blanching, steeping, sun drying, canning, pickling, freeze drying. Storage – short term and long tem storage. **6** Hours

Module V

Common Indian mushrooms. Production level, economic return, Foreign exchange from Mushroom cultivating countries and international trade. **6** Hours

PRACTICALS

1. Practical method of mushroom cultivation.

REFERENCES

1. Anonymous, **Indian Journal of Mushrooms.** Published by I.M.G.A. Mushroom Research Laboratory. College Agriculture, Solan
2. Gupta P.K. Elements of Biotechnology.
3. Harander Singh. 1991. Mushrooms- The Art of Cultivation- Sterling Publishers.
4. Kaul T N 2001. Biology and conservation of mushrooms. Oxford and IBH publishing company N.Delhi
5. Pandey B P 1996. A textbook of fungi. Chand and company N Delhi.

3. ENVIRONMENTAL SCIENCE

Course Code: 5D03BOT/PLS

No. of credits- 2 **No. of contact hours- 36**

Module-1-Ecosystem **10hrs**

Introduction-Basic principles and concepts of ecology and environment-Interdisciplinary approach-Scope and relevance to society and human environment. Need for public awareness.- Ecosystem–Definition, ecosystems-concept of an ecosystem –structure and function of an ecosystem. a) Abiotic factors : Climate shapes the character of ecosystem. - Edaphic factors- b) Biotic factors- .Kinds of ecosystem. human activity is placing the biosphere under increasing stress- Dynamics of Ecosystem Energy flow in an ecosystem , food chain.-Food web and ecological pyramids.Biogeochemical cycle: Gaseous-Carbon ,Oxygen & Nitrogen. Hydrological- Water-EcologicalSuccession-definition, types, causes of succession, process of succession. Hydrosere and Lithosere .Ecological adaptation of Hydrophytes, Xerophytes, Halophytes, epiphytes and parasites

Module-2-Natural resources **8hrs**

Renewable and non-renewable resources. Natural resources and associated problems.- Forest resources- deforestation, aforestation, -conservation-protection forestry-chipko movement-production-commercial forestry -socialforestry, Agroforestry -timber extraction, mining, dams and their effects on forest and tribal people-Mineral resources- Environmental effects of extracting and using mineral resources- Water resources-use and overuse of surface water and ground water-floods, droughts – Food resources –World food problems- Energy resources : Growing energy needs, renewable and non-renewable resources-use of alternate energy sources- Land resources : Land as a resource, land degradation , man- induced land slides, soil erosion and desertification-Equitable use of resources for sustainable life styles.

Module 3- Social issues and the environment **13hrs**

Environmental pollution a)Definition, causes-effects and control measures. Types of pollution -Air, Water, Solid wastes-management-, radioactive, noise & thermal pollution.-Role of an individual in prevention of pollution. Pollution case studies. Role of pollution control board.- From unsustainable to sustainable development. Urban problems related to energy. Water conservation- Rain water harvesting and water shed management. Resettlement and rehabilitation of people- its problems and concerns -Environmental ethics: issues and possible solutions - Climate change and Global warming, acid rain, ozone layer depletion, nuclear accidents-Wasteland reclamation, Issues involved in enforcement of environmental legislation-.Public awareness-Human population and environment-Population growth, variation among nations. Population explosion- Family welfare program. Environment and human health: Human rights – The Ecological crisis-industrialization-the human transformation of the earth- human activity is placing the biosphere under increasing stress. growth of the world economy-.urbanization.-the vulnerable planet. World Earth summits and protocols-Rio,Kyoto. Johannesberg. The failure of ecological reforms-Environmental revolution.

Module 4-Biodiversity and its Conservation **5hrs**

Biodiversity-Concepts of biodiversity -Types of biodiversity- biodiversity in India. India as mega diversity nation- hotspots of biodiversity ,threats to biodiversity-.Conservation of biodiversity-: The conservation strategies are multidimensional.. -National parks, wildlife sanctuaries.

REFERENCES

1. Agarwal K .C . – Envoronmental Biology – Nidi Pub:
2. Aggarwal, S. K., 2009. Foundation Course in Biology, 2nd edn., Ane Books Pvt. Ltd., New Delhi.
3. Ambasht R.S. & Ambasht N.K., A Text of Plant Ecology. Students' Edition, 1996, Friends &Co., Lanka, Varanasi – India.
4. Bharucha, E. 2005. Textbook of Environmental Studies for Undergraduate Courses. Universities Press (India) Private Limited, Hyderabad.

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6. Jadhav H. Environmental Protection laws – Himalaya Pub:
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17. Rao M .N . & Dutta A .K . Waste Water Management – Oxford &IBH
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25. Verma V. – Text book of Plant Ecology – Emkay Pub:
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2. MEDICINAL PLANTS

Course code- 5D02BOT/PLS

Contact Hours- 36 **Credit – 2**

Module I **8** Hours

Ethnobotany- definition- categories-major tribes of south India- regional studiesethnomedicinal plants- wild food plants- socio-economic status.

Module II **6** Hours

Importance and conservation of medicinal plants – *Insitu, exsitu*, sacred groves. Role of ICAR, IMPB, BSI, NBPGR and FRLHT in conservation and cultivation of medicinal plants. IPR issues.

Module III **8** Hours

Pharmacognosy – definition and scope – ancient and modern science (*sidha, ayurveda unani and homeopathy*), Classification of vegetable drugs, identification of drugs (taxonomical, anatomical, and chemical).

Module IV **8** Hours

A general account of the methodology of cultivation of medicinal plants. Rhizome – *Curcuma,* Ginger; Tuber- *Allium cepa* ; Root – *Asparagus, Hemidesmis, Acorus calamus* ; Twigs- *Adhathoda vasica, Catharanthus roseus, Phyllanthus amarus, Andrographis paniculata* ; Leaves – *Aloe vera* , *Centella asiatica*.

Module V **6** Hours

Sources of vegetable drugs – biological, geographical and cultural. Production of vegetable drugs – Role of growth regulators. Deterioration of drugs and their control measures – Adulteration of drugs.

Practicals

1. Familiarize with at least 5 folk medicines and report the source cultivation and extraction.
2. Visit to an Ayurveda college or Arya Vaidya sala.
3. Identification of the medicinal plants in **module IV.**

REFERENCES

1. Anil K Dhiman.2003. Sacred Plants and their medicinal uses. Daya publishing house New Delhi.
2. Jain S K 1981. Glimpses of Indian ethnbotany. Oxford and IBH New Delhi.
3. Jain S K 1990. Contribution Indian ethnobotany. Scientific publishers Jodhpur
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7. Singh G K and Anil Bhandari 2000. Textbook of Pharmacognosy. CBS publishers N.Delhi.
8. Verma V 2009. Text book of Economic Botany. Ane Book

Reg. No.:……

Name:……

V Semester B.Sc. Degree Examinations.

OPEN COURSE - I
COURSE CODE - 5D01BOT/PLS - MUSHROOM CULTIVATION AND MARKETING

Time: 2 hrs **Marks: 20**

Section A *(Answer all)*

1. Name the spore in Agaricus.
2. Name a poisonous mushroom.
3. Which class does club fungi belongs to?
4. Name the umbrella shaped structure of Agaricus.

(1x4=4)

Section – B

Answer any *five* from the following**.**

5. What is spawning?
6. Give the common name and scientific name of any two edible mushrooms.
7. How mushrooms can be harvested?
8. What is Canning?
9. Give an account of composting material used in mushroom cultivation.
10. What is meant by prickling of mushrooms?
11. Give the medicinal value of mushroom.
12. Write the systematic position of Agaricus.

(1x5=5)

Section – C

Answer any *three* from the following.

13. Give nutritional value of mushrooms.
14. With the help of diagram explain the structure of basidiocarp of Agaricus.
15. Explain the preparation of substrate for mushroom cultivation.
16. Differentiate blenching and steeping?
17. Discuss the methods for long term storage of mushrooms.
18. Briefly explain the international trade of mushrooms.

(2x3=6)

Section - D

Answer any *one* from the following**.**

19. Discuss the various diseases an insect attack in mushroom cultivation.
20. With the help of diagram explain the life cycle of *Pleurotus.*
21. Explain the various steps in cultivation of mushrooms.

Reg. No.:……
Name:……

V Semester B.Sc. Degree Examinations.

OPEN COURSE - II

COURSE CODE - 5D03BOT/PLS – ENVIRONMENTAL SCIENCE

Time: 2 hrs **Marks: 20**

Section A *(Answer all)*

1. Mangroves are _____
   a. parasite b. halophyte c. hydrophyte d. xerophytes
2. Which among the following is a greenhouse gas?
   a. argon, b. water vapour, c. ethelene ,d. oxygen
3. A renewable resource
   a. wind, b. petrol, c. coal, d. none of these
4. Minamata disease is associated with
   a. Mercury, b. Lead, c. Arsenic, d. Cadmium)

(1x4=4)

Section – B

Answer any *five* from the following.

5. What is meant by social forestry?
6. What is nuclear holocaust?
7. Differentiate between insitu and ex situ conservation.
8. What is meant by resettlement and rehabilitation?
9. Point out the reasons for acid rain
10. What are hot spots?
11. Give the role of CPCB.
12. What are decomposers? Give an example.

(1x5=5)

Section – C

Answer any three from the following

13. Explain Ecological succession.
14. What is solid waste management? Give amethod.
15. Why India is considered as Amegadiversity nation?
16. How are the xerophytes adapted ?
17. Give the effects of noise pollution.
18. Give an account on Kyoto protocol.

(2x3=6)

Section - D

Answer any *one* from the following.

19. Explain the causes , effects and control measures of air pollution
20. With the help of schematic diagram explain Nitrogen cycle.
21. Explain the term biodiversity. Give the major threats for its loss and explain conservation strategies.

(1x5=5)

Reg. No.:……

Name:……

V Semester B.Sc. Degree Examinations.

OPEN COURSE - III

COURSE CODE - 5D02BOT/PLS - MEDICINAL PLANTS

Time: 2 hrs **Marks: 20**

Section A *(Answer all)*

1 .Vincristine is obtained from

a. Terminalia , b. Rosy periwinkle, c. Hemidesmus, d. All the above

2. Coriander belongs to

a. spices, b. contiment, c. pulses, d. stimulant

3. Which part of the terminalia is useful

a. leaves, b. root, c. stem, d. fruit

4. Number of trees in Dashamoolam

a. six, b. three, c. five, d. ten.

(1x4=4)

Section – B

Answer any *five* from the following

5. Give the uses of curry leaves in day to day life.
6 .Which one is known as 'margosa tree '. Mention its two uses.
7. Name the combination of Triphala in ayurveda.
8. What are the common uses of emblica fruit?
9. Mention any two diseases in ginger.
10. Which plant is known as "king of bitter ". Give its scientific name.
11. Give the role of ICAR and IMPB in conservation.
12. What do you mean by IPR?

(1x5=5)

Section – C

Answer any *three* from the following.

13. Define Pharmacognosy? Give its scope and importance.
14. Briefly explain the term adulteration of drugs.
15. How are ginger cultivated?
16. Give the medicinal properties and cultivation practices of of Adhathoda vasica.
17. Discuss theuses of Rauvolfia (Sarpagandha) and Mucuna pruriens.
18. Give an account of traditional healers in medicine.

(2x3=6)

Section - D

Answer any *one* from the following.

19. Briefly explain the various conservation practices of medicinal plants.
20. Discuss about any five medicinal plants used in our day to day life.
    a) Ocimum sanctum
    b) Rosy periwinkle
21. Briefly explain the ayurvedic combination Dasapushpa.

(1x5=5)

BOTANY COMPLEMENTARY COURSE

COMPLEMENTARY – 1

DIVERSITY OF LIFE-MICROBES & THALLOPHYTES

COURSE CODE- 1C01BOT/PLS

No. of credits- 2 **Contact hours- 36**

Module 1. Categories of living organisms **3Hrs**

Major categories of living organisms-kingdoms of life-six kingdoms of life by Carl Woese - three domains of living organisms- archaea, bacteria, eukarya- characteristics and evolutionary relationship among the three domains- four kingdoms of eukaryotes--key characteristics of prokaryotes and eukaryotes.

Module-2-Viruses and Prokaryotes **8 Hrs**

General account of Viruses and Bacteria- Structure and reproduction of Bacteriophage - Economic importance of Viruses and Bacteria - Cyanobacteria- General account and economic importance.Nostoc - Structure and reproduction.

Module -3 – Algae **15hrs**

Algae- General account, economic importance and Classification. General characters , structure and reproduction of Chlophyceae (volvox, spirogyra, chara); pheophyceae (sargassum) and Rhodophyceae (Polysiphonia)

Module-4 Fungi and Lichens **10 hrs**

General characters- Classification - Economic importance - Structure, reproduction and life history of the following- Rhizopus, Puccinia. Lichen - brief account only. Usnea- structure and reproduction..

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PRACTICALS 36 hrs

Examine, draw, and identify the following specimens assigning reasons

1. Identify TMV, Bacteriophages, bacteria from the photographs.

2. Nostoc- colony, trichome enlarged

3.. Rhizopus asexual and sexual.

4.. Puccinia –Teleuto-, Uredo-, Pycnial- and Aecidial sori VS.

5. Usnea thallus with apothecium, Apothecium V.S.

6. Volvox, colony with daughter colony, showing zygote

7.Spirogyra, single filament,single cell scalariform and lateral conjugations.

8. Chara thallus and sex organs

9. Sargassum, thallus, stipe T.S, male and female receptacle.

10. Polysiphonia – thallus, tetrasporophyte and cystocarp

Reg. No.:……

Name:……

I Semester B.Sc. Degree Examinations.

BOTANY (Complimentary)

COURSE CODE – 1C01BOT – Diversity of Life- Microbes and Thallophytes

Time: 3 Hours Total marks: 32

Section-A (*Answer all*)

1. Which of the following is a motile spore in fungi?
   (a) Aplanospore (b) Zoospore (c) Hypnospore (d) Endospore
2. In bacteriophage the tail is made up of ……..
   (a)Enzyme Coat (b) Protein Coat (c) Lipid Coat (d) Carbohydrate
3. Which is not a character of prokaryotic cells?
   (a)Multicellularity (b) Absence of Nucleus (c) Circular DNA (d) Flagella
4. Floridean starch is a food product found in …..
   (a) Chlorophyceae (b) Phaeophyceae (c) Rhodophyceae (d) Xanthophyceae
5. Which of the following is not present in Bacteria.
   (a) Cell wall (b) RNA (c) Flagella (d) Mitochondria

(5X1= 5)

Section-B (*Answer any four)*

6. Write a short account on the vegetative methods of reproduction in fungi.
7. What is a lichen? Mention different types.
8. Describe the different types of chloroplasts present in Green Algae?
9. Draw a labelled diagram of the structure of Bacteriophage.
10. Explain asexual reproduction on Nostoc.
11. With the help of diagrams briefly explain scalariform conjugation in Spirogyra.

(4X2=8)

Section- C (Answer any three)

12. Explain the thallus evolution in green algae.
13. Virus means poison. Substantiate the statement.
14. Many of the prokaryotes are economically very important. Discuss the statement.
15. Write an account on structure and reproduction of *Polysiphonia*.
16. Compare the characters of Archaea and Eubacteria.

(3X3= 9)

Section- D (Answer any two)

17. What is *Puccinia* Rust disease? Write two host plants of this disease. Explain one stage from each host plant.
18. With the help of labeled sketch describe the structure and life cycle of a Bacteria.
19. Explain the three kingdom, five kingdom and six kingdom classification of living organisms.
20. Explain the structure of reproductive organs in Chara.

2X5= 10)

COMPLEMENTARY COURSE – 2

ARCHAEGONIATAE, PALAEOBOTANY AND REPRODUCTION IN ANGIOSPERMS

COURSE CODE - 2C02BOT/PLS

No. of credits- 2 **Contact Hours - 36**

Module-1 Bryophyta **(6hrs)**.

Bryophyta -General characters and classification -Structure, and reproduction of Riccia and Funaria.

Module -2 Pteridophyta **(6 hrs)**

Pteridophyta - General characters and classification - Structure and reproduction of Selaginella

Module -3 Gymnosperms **(6 hrs)**

Gymnosperms - General account, and classification ,Cycas, structure and reproduction

Module-4 Paleobotany **(6 hrs)**

Objectives of Paleobotany – Geological time scale- Fossil formation and types- a brief account only. Fossil plants (Rhynia, Lepidodendron)

Module-5. Angiosperms Reproductive Botany **(12 hrs)**

Angiosperms-General characters and advanced features (brief account only). Flower as a modified shoot; .Flower-Parts- arrangement -relative position –structure of anther and pistil-Microsporogenesis and microgametogenesis.-Mega sporogenesis and mega gametogenesis.- Mega gametophyte. Monosporic – Polygonum type-Pollination and fertilization. Dicot and monocot embryo-Endosperm- Nuclear, Cellular and Helobial –(brief account only.)

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15..Vasistha B.R. - Bryophyta, S. Chand & Company

PRACTICALS 36 Hrs

Make, examine, draw, and identify micro preparations of the following specimens. And identify the reproductive stages assigning reasons

1. Riccia habit, thallus T.S. Thallus T.s. with antheridia and archegonia

2) Riccia thallus with sporogonium V.S.

3). Funaria- gametophyte with sporophyte- protonema- antheridial cluster and archegonial cluster-capsule L.S.

4) Selaginella, habit, stem T.S., strobilus V.S.

5) Cycas, seedling, coralloid root T.S., leaf let and rachis T.S. male cone entire and V.S of Microsporophyll and, megasporophyll,. Ovule, ovule V.S.

6). Palaeo Botany Identify with reasons: 1. Rhynia 2. Lepidodendron

7). Angiosperm Embryology Identify: 1. T.S of mature anther, 2. Dicot embryo 3. Monocot embryo.

Reg. No.:……
Name:……

II Semester B.Sc. Degree Examinations.

BOTANY (Complimentary)

COURSE CODE – 2C02BOT –Archegoniatae, Paleobotany and Reproduction in Angiosperms

Time: 3 Hours Total Weightage: 32

Section-A

1. The most common type of ovule is …….
   (a) Anatropus (b) Orthotropus (c) Circinotropus (d) Campylotropous
2. The cap like structure covering the capsule of moss
   (a) Stomium (b) Annulus (c) Operculum (d) Peristome
3. The number of microspore mother cells required for the production of 100 microspores is……..
   (a) 100 (b) 75 (c) 50 (d) 25
4. Coal is an example for ……..
   (a) Compression (b) Impression (c) Amber (d) Petrifaction
5. Prothallus of fern is……..
   (a) Haploid (b) Diploid (c) Triploid (d) Polyploid

(5X1 =5)

Section-B (Aswer any four)

6.Describe the anatomy of Rhizophore in *Selaginella* .
7. Write any four evidences to consider that Cycas is a living fossil?
8 . Describe the structure of a monosporic 8-nucleate embryosac.
9. Give an account on the vegetative reproduction in Bryophytes.
10. Enumerate the functions of Tapetum.
11 With the help of a labelled diagram describe the structure of sporogonium in Riccia.

(4X2=8)

Section- C (Answer any three)

12. What is a strobilus? Describe the structure of male cone of Cycas with labelled diagrammes.
13. Give a brief description of the micro and megagametophyte of Selaginella.
14. What is a fossil? Explain briefly the process of fossilization
15. Explain the internal structure of Riccia thallus with a neat labeled diagram.
16. The nucellar cell of an ovule has the chromosome number 40. Find out the chromosome number of the following.
    a) egg b) antipodals c) Zygote d) Endosperm e) Synergids
    f) Secondary nucleus

(3X3=9)

Section- D (Answer any two)

17. Describe sexual reproduction in Cycas. Add a note on its life cycle.
18. Give a diagrammatic representation and description of the gametophytic and sporophytic generations of Funaria. Comment on its alteration of generations.
19. With the help of neat labelled diagrams explain microsporogenesis in angiosperms.
20. With the help of diagram explain the morphology of Rhynia plant.

(2X5=10)

COMPLEMENTARY COURSE – 3

ANGIOSPERMS–MORPHOLOGY,SYSTEMATICS,UTILITY,PLANT BREEDING AND PLANT PATHOLOGY
COURSE CODE: 3C03BOT/PLS

No. of credits- 2 No. of contact hours- 54

Module 1: Morphological variation of flower 10 Hrs

Inflorescence: Racemose, Cymose, special type and Mixed types.-Flower - arrangement- relative position, cohesion, adhesion, Symmetry of flower-.Aestivation- types; Placentation- types.Floral diagram and floral formula, Fruits-classification- simple, aggregate and multiple.

Module2: Angiosperm Systematics 20 Hrs

Objectives & importance of taxonomy. Plant nomenclature (brief account only),Taxonomic hierarchy, Systematics and Taxonomy, Brief history of angiosperm classification. Artificial, natural and phylogenetic (Brief Account only). Herbarium and herbarium technique. Detailed study of Bentham & Hooker's system. Herbarium & herbarium technique .Study of the following families with special reference to morphological adaptation and their economic importance. (Follow Bentham and Hooker's system) Annonaceae, Malvaceae, Rutaceae,Fabaceae, Rutaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, and Poaceae.

Module3: Utility of Plants 10 Hrs

Study of the following with special reference to their botanical name, family, morphology of useful parts and uses. Cereals and Millets - Rice, Wheat and Ragi. Pulses - Red gram, Green gram, Black gram and Horse gram. Sugar- yielding - Sugar cane.; Fiber- yielding - Cotton, Coir and Jute. Dye-yielding - Indigo and Henna; Latex –yielding - Para rubber. Oil- yielding -Palm oil, Sesame oil and coconut oil. Tuber crops - *Tapioca*, *Amorphophallus* and *Colocasia*; Tropical fruits - Banana, Jack and Pine apple. Spices - Cardamom, Clove and Pepper; Beverages - Tea and Coffee. Medicinal plants- *Ocimum, Acorus*, *Adhatoda, Sida, Phyllanthus,Turmeric, Vinca* and *Rauvolfia.*

Module 4 Plant breeding 8 Hrs

Plant breeding - Objectives and methods. Plant introduction and acclimatization. Brief account of mass selection, pure line selection and clonal selection. Mutation breeding, polyploidy breeding and hybridization. Plant tissue culture- objectives and methods

Module-5 Plant pathology **6 hours**

Classification of plant diseases based on causative organisms and symptoms- Study of the following diseases with reference to their symptom, etiology, and control measures- Leaf mosaic of Tapioca, Blast disease of Paddy, Grey leaf spot of Coconut, Quick wilt of Pepper and Citrus canker.

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PRACTICALS 36 Hrs

1. Angiosperm Morphology Demonstrate inflorescence and fruits during taxonomy practical. (Need not report in the practical record) Angiosperm Systematics Refer the Angiosperms included in the syllabus to their respective families assigning reasons. Annonaceae, Malvaceae, Papilionaceae, Rutaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, and Poaceae.

2. Draw labeled diagrams of the flower V.S., construct floral diagrams and floral formula and describe using technical terms.

3. Identify; write the binomial and family of the herbarium specimens submitted by the students.

4. At the time of practical examination students have to submit laboratory record, herbarium and field book for verification.

5. Utility of Plants Identify with Botanical name, family and morphology of the useful parts of the plants mentioned in the syllabus.

6. Crop Improvement 1. Demonstrate grafting, budding and layering. 2. Demonstrate the technique of emasculation in Crotalaria.

7. Plant Pathology Identify the plant diseases mentioned in the syllabus

Reg. No.:……

Name:……

III Semester B.Sc. Degree Examinations.

BOTANY (Complimentary)

COURSE CODE –3C03 BOT-Angiosperms- Morphology, Systematics, Utility, Plant breeding and Plant pathology

Time: 3 Hours Total Weightage: 32

Section-A (Answer all)

1. A pendant inflorescence of unisexual flowers.
(a) Capitulum (b) Spadix (c) Umbel (d) Catkin
2. Which of the following is not a plant fiber?
(a) Coir (b) Cotton (c) Silk (d) Jute
3. Causative organism of Blast disease of Paddy
(a) *Phytophthora infestans* (b) *Pyricularia oryzae*(c) *Ustilago tritici* (d) *Puccinia graminis*
4. A caryopsis is a fruit
(a) Without a fruit wall (b) With a fruit wall fused with the seed coat
(c) having many seeded, fleshly nature (d) that dehisces to expose the seeds violently
5. The process of crossing of two plants differing from each other genetically in one or more traits called
a) Layering b) Budding c) Hybridization d) Scootee

(5x1=5)

Section-B (Answer any four)

6. What is a Cremocarp? Mention the family in which it is observed.
7. Give the Botanical name, family and useful part of Sesame.
8. Write the floral formula of a named plant under Malvaceae.
9. What are the monocotyledonous features found in the family Annonaceae
10. Describe the Gynoecium of Papilionaceae
11. Write the symptoms of Grey leaf spot of Coconut and Quick wilt of pepper

(4x2=8)

Section C (answer any three)

12. Write short notes on Cyathium inflorescence
13. Write the pathogen ,symptom and control measures of the disease Citrus canker
14 Discuss the advanced features of Asteraceae
15. With illustration describe the adnation in solanaceae
16. Write about herbarium and herbarium techniques.

(3X3=9)

Section–D (Answer any two questions)

17..Explain the characteristics of family Orchidaceae. What are the advanced features found in the family.
18.. Describe Bentham and Hookers system of classsification. Write the merits of this system.
19. With the help of neat labelled diagrams describe the different types of simple fruits in Angiosperms.
20. Differentiate Mass selection from pure line selection. Write the advantages and disadvantages of both

2x2=10

COMPLEMENTARY COURSE – 4

ANGIOSPERM - ANATOMY AND PHYSIOLOGY

COURSE CODE: 4C04BOT/PLS

No. of credits- 2 **No. of contact hours- 54**

Module 1 Angiosperm Anatomy **24 Hrs**

Objectives and scope – Ultra structure of the plant cell wall-components, pits, primary pit fields, plasmodesmata, origin and growth. Ergastic substances-.Reserve, secretory and by products. Tissues—simple, complex, meristematic- structure and function- Classification of meristems based on origin and position-Apical cell theory- Histogen theory and Tunica-Corpus theory-Organization of shoot apex and root apex. Parenchyma, collenchyma, sclerenchyma, Xylem, Phloem Cambium-origin, structure-storied and non storied, activity. Primary structures of Root, stem and leaves-Dicots and monocots- Secondary growth- Dicot stem and dicot root- Anomalous secondary growth-Dicot stem- Boerhaavia

Module 2: Plant Physiology - Plant Water Relations and Mineral Nutrition 12 Hrs

Cell as a physiological unit. Osmosis, Imbibition. Diffusion-D.P.D. Water potential, Absorption of water, (active & passive), Plasmolysis, cohesion, tension and transpiration pull theory. Transpiration-Significance, factors affecting transpiration, mechanism of stomatal opening and closing, (k+ transport theory)-Guttation and antitranspirants . Mineral nutrition- The elements in plant dry matter-Methods of studying plant nutrition, solution culture-The essential elements-criteria of essentiality-functions-nutrient deficiency symptoms and functions of elements-a brief review. Absorption of mineral elements-Roots as absorbing surfaces-passive and active absorption-simple and facilitated diffusion. How carriers and channels speed passive transport-Donnan equilibrium-Active uptake –carrier concept

Module 3 Photosynthesis **12 Hrs**

Significance**,** site of photosynthesis, pigments, photochemical phase-Electron transport chain. Photophosphorylation- cyclic and non cyclic-Biosynthetic phase, Calvin cycle, C3 and C4 pathways-Photorespiration, Crassulacean Acid Metabolism, factors affecting photosynthesis. Law of limiting factors- Leaf factor. Chemosynthesis- a brief account. Transport in the phloem Source – sink relationship and translocation in sieve tubes- Evidences of phloem transport.-experiments-phloem loading and unloading. Mechanism of sieve tube translocation Pressure flow hypothesis Translocation of food –path and mechanism Nitrogen Metabolism-sources of N2 – N2 fixation-symbiotic and non symbiotic –ammonium assimilation

Module 4: Plant Growth & Regulation **6 Hrs**

Phases of growth-growth curve-Plant hormones - Auxins, Gibberillins,Cytokinins, Ethylene, Absisic acid - physiological functions .-Senescence – Photoperiodism- physiology of flowering. photomorphogenesis; phytochromes. physiological role. Vernalization.

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PRACTICALS **36 hrs**

Plant Physiology

1. Explain with suitable diagrams and working of experiments setup to demonstrate various physiological phenomena. a) Osmosis - Thistle funnel osmoscope. b) Effect of stomatal number on rate of transpiration. (Cobalt chloride test) c) Effect of root pressure on ascent of sap. d) Relation between absorption and transpiration. (Water balance) e) Rate of transpiration by Ganong's potometer. f) Separation of different photosynthetic pigment using paper chromatography. g) Rate of photosynthesis by Wilmot's bubbler

Angiosperm Anatomy

1. Students must be able to identify: non living inclusions, Raphides, Cystolith, Starch grain, Aleurone grain., Schizogenous cavity in Pinus, Lysigenous cavity in Citrus.

2. Prepare stained transverse sections, draw cellular diagrams and identify the following: a) Primary structure of dicot stem- Centella, and Cephalandra. b) Monocot stem-Bamboo or Grass. c) Primary structure of dicot root -Helianthus or Pea ; Monocot root-Colocasia or Rhoeo d) Dicot leaf-Ixora; Monocot leaf-Grass , e) Dicot stem- secondary - Vernonia and Tinospora f). Dicot root secondary- Ficus, or Ricinus. g) Anomalous secondary growth:Dicot stem – Boerhaavia,.

Reg. No.:……
Name:……

IV Semester B.Sc. Degree Examinations.
BOTANY (Complimentary)
COURSE CODE –4C04 BOT - Angiosperm- Anatomy and Physiology

Time: 3 Hours Total Weightage: 32

Section A (Answer all)

1. Stomatal opening and closing is associated with
   a) C^+ ions b) H^+ ions c) K^+ ions d) Fe^+ ions
2. Growth rings are formed due to the activity of ……..
   a) Primary cambium b) Extra stelar cambium
   c) Intra stelar cambium d) Cork cambium
3. Water secreting glands in plants are
   a) Nectaries b) Hydathodes c) Digestive glands d) Lenticels
4. Photosynthesis is maximum in
   a) Blue light b) Green light c) red light d) Red and blue light
5. Phosphorus is a component of
   a) Starch b) Nucleoside c) Fat d) Amino acid.

(5 X 1= 5)

Section B (Answer any four)

6. Write a short note on transpiration pull theory
7. Explain CAM Pathway
8. Why xylem is considered as a complex Tissue?
9. Define turgor pressure.
10. Name the micronutrients and macro nutrients.
11. Write an account of different types of simple tissues.

(4 X 2 = 8)

Section C (answer any three)

12. How does secondary thickening occur in dicot stem?
13. Explain the mechanism of Guttation
14. Describe the process of photorespiration.
15. Write the mechanism of sieve tube translocation
16. Write short notes about the importance of osmosis in plant life.

(3X3=9)

Section D (Answer any two)

17. Describe the C3 cycle of photosynthesis in plants? How does it differ from C4 Cycle?
18. What is meant by Anomalous secondary growth in thickness? Explain with suitable diagram, the anomalous secondary growth in Boerhaavia stem.
19. Give an account on growth hormones present in plants.
20. Explain the role of macronutrients in plants .

(2X5= 10)

COMPLEMENTARY-5

BOTANY COMPLEMENTARY PRACTICAL

COURSE CODE: 4C05BOT/PLS

No. of credits- 4 No. of contact hours- 144

I SEMESTER

DIVERSITY OF LIFE- MICROBES, FUNGI, LICHENS AND ALGAE 36 Hrs

Examine, draw, and identify the following specimens assigning reasons

1. . Identify TMV, Bacteriophages, bacteria from the photographs. 2. Nostoc- colony, trichome enlarged 3.. Rhizopus asexual and sexual. 4.. Puccinia –Teleuto-, Uredo-, Pycnial- and Aecidial sori VS. 5. Usnea thallus with apothecium, Apothecium V.S. 6. Volvox, colony with daughter colony, showing zygote 7.Spirogyra, single filament,single cell scalariform and lateral conjugations.8. Chara thallus and sex organs 9. Sargassum, thallus, stipe T.S, male and female receptacle. 10. Polysiphonia – thallus, tetrasporophyte and cystocarp

IISEMESTER:

BRYOPHYTA, PTERIDOPHYTA, GYMNOSPERMS, PALAEOBOTANY AND ANGIOSPERM- REPRODUCTIVE BOTANY 36 Hrs

Make, examine, draw, and identify micro preparations of the following specimens. And identify the reproductive stages assigning reasons 1. Riccia habit, thallus T.S. Thallus T.s. with antheridia and archegonia 2) Riccia thallus with sporogonium V.S.3). Funaria- gametophyte with sporophyte- protonema- antheridial cluster and archegonial cluster- capsule L.S. 4) Selaginella, habit, stem T.S., strobilus V.S. 5) Cycas, seedling, coralloid root T.S., leaf let and rachis T.S. male cone entire and V.S of Microsporophyll and, megasporophyll,. Ovule, ovule V.S. Palaeo Botany Identify with reasons: 1. Rhynia 2. Lepidodendron Angiosperm Embryology Identify: 1. T.S of mature anther, 2. Dicot embryo 3. Monocot embryo.

III SEMESTER:

ANGIOSPERMS MORPHOLOGY, SYSTEMATICS, UTILITY, IMPROVEMENT AND PLANT PATHOLOGY 36 Hrs

Angiosperm Morphology Demonstrate inflorescence and fruits during taxonomy practical. (Need not report in the practical record) Angiosperm Systematics 1. Refer the Angiosperms included in the syllabus to their respective families assigning reasons. Annonaceae, Malvaceae, Papilionaceae, Rutaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, and Poaceae.

2. Draw labeled diagrams of the flower V.S., construct floral diagrams and floral formula and describe using technical terms.

3. Identify; write the binomial and family of the herbarium specimens submitted by the students.

4. At the time of practical examination students have to submit laboratory record, herbarium and field book for verification.

5. Utility of Plants Identify with Botanical name, family and morphology of the useful parts of the plants mentioned in the syllabus.
6. Crop Improvement 1. Demonstrate grafting, budding and layering. 2. Demonstrate the technique of emasculation in Crotalaria.

7. Plant Pathology Identify the plant diseases mentioned in the syllabus

IV SEMESTER:

PLANT PHYSIOLOGY AND ANGIOSPERM ANATOMY 36 Hours:

Plant Physiology 1. Explain with suitable diagrams and working of experiments setup to demonstrate various physiological phenomena. a) Osmosis - Thistle funnel osmoscope. b) Effect of stomatal number on rate of transpiration. (Cobalt chloride test) c) Effect of root pressure on ascent of sap. d) Relation between absorption and transpiration. (Water balance) e) Rate of transpiration by Ganong's potometer. f) Separation of different photosynthetic pigment using paper chromatography. g) Rate of photosynthesis by Wilmot's bubbler

Angiosperm Anatomy 1. Students must be able to identify: non living inclusions, Raphides, Cystolith, Starch grain, Aleurone grain., Schizogenous cavity in Pinus, Lysigenous cavity in Citrus. 2. Prepare stained transverse sections, draw cellular diagrams and identify the following: a)Primary structure of dicot stem- Centella, and Cephalandra. b) Monocot stem-Bamboo or Grass. c) Primary structure of dicot root -Menianthus or Pea ; Monocot root-Colocasia or Rhoeo d) Dicot leaf-Ixora; Monocot leaf-Grass , e) Dicot stem- secondary - Vernonia and Tinospora f). Dicot root secondary- Ficus, or Ricinus. g) Anomalous secondary growth:Dicot stem – Boerhaavia,.

- <u>One or two days field trip to geographically different localities of botanical interest /botanical gardens/Research stations is recommended.</u>

Botany- B.Sc. Practical- Model Question Paper

BOTANY (COMPLEMENTARY COURSE)-Practical

Course Code: 4C05BOT/PLS

Time: 3 Hours Max. Mark= 30

1. Take a T.S. of material **A)** stain and mount in glycerin, draw a cellular diagram of a portion enlarged, Label the parts, identify giving reasons. Leave the preparation for valuation

(Preparation- 2, labeled diagrams- 1.5, identification 0.5, reasons 1) (5)

2. Refer the specimen **B)** to its respective family. Give the systematic position. Point out the important characters of identification.

(Identification- 0.5, systematic position- 0.5, reasons -2) (3)

3. Take the V.S of the flower **C),** Leave the preparation for valuation. Draw the V.S. of the flower. Construct the floral diagram and write the floral formula.

(Diagram- 1, floral diagram- 0.5 and floral formula- 0.5) (2)

4. Make the micro preparations of **D)** & **E)**. Stain and mount in glycerin, Leave the preparation for valuation. Draw a labeled cellular diagram Identify giving reasons.

(Preparation -1, identification- 0.5, labeled diagram -0.5, reasons- 1) (3 x 2=6)

5. Identify specimens **F)** & **G)** with reasons.

(Identification -0.5, reason- 1 (1.5 x 2 = 3)

6. Identify the disease **H)** Name the pathogen. Write the important symptoms.

(Disease- 0.5 pathogen -0.5, symptoms -1) (2)

7. With a labeled diagram explain the working of the experiment **I)** Mention the aim.

(Aim- 0.5, labeled diagram -1, working -1.5. (3)

8. Identify the specimen **J)** giving important reasons.

(Identification -0.5, reason- 1) (1.5)

9. Spot at sight **K), L) & M)**. (0.5x3= 1.5)

10. Write the botanical name and family of the given specimens **N) & O).**

(Binomial -0.5, family- 0.5) (1 x 2 = 2)

11. Give the binomial and family of the given herbarium sheet **P)**

Binomial -0.5, family -0.5 (1)

Key to Specimen

1. Anatomy of monocot stem, dicot stem and root – primary and secondary- Dicot stem and root, Anomalous growth as *Boerhaavia* stem. Mentioned in the syllabus (A)
2. Families mentioned in the syllabus(B)- Avoid monocot families.
3. Flowers with buds as mentioned in the syllabus (C) - Avoid monocot families.
4. Thallophyta (D) and Bryophyta/Pteridophyta (E)
5. Embryology –F; Anatomy -G.
6. Specimens from pathology mentioned in the syllabus -H.
7. Physiology experiment as mentioned in the syllabus-I
8. Specimen from Palaeo Botany mentioned in the syllabus-J
9. Thallophyta, Bryophyte & Pteridophyta.(K, L) - Gymnosperm.- (M)
10. Specimens – N& O mentioned in the syllabus - direct products only.
11. Herbarium sheet –P