

KANNUR UNIVERSITY

(Abstract)

B.Sc Botany Programme-Scheme & Syllabus of Core, Complementary and Open Courses under Choice Based Credit Semester System for Under Graduate Programme-implemented with effect from 2009 admission-Orders Issued.

ACADEMIC BRANCH

U.O.No.Acad/C2/2471/2007(1)

Dated, K.U.Campus. P.O ,08- 07-2009.

- Read: 1.Minutes of the meeting of the Board of Studies in Botany (UG) held on 27-05-2009.
2. Minutes of the meeting of the Faculty of Science held on 16-06-2009.
3. U.O No.Acad/C2/3838/2008 (i) dated 07-07-2009
4. Letter dated 29-06-2009 from the Chairman, BOS in Botany (UG).

ORDER

1.The Board of Studies in Botany(UG) vide paper read(1) above has prepared finalised and recommended the Scheme and Syllabus of Botany Core,Complementary and Open Courses under Choice Based Credit Semester System for implementation from 2009 admission.

2. The recommendations of the Board in restructuring the syllabus is considered by the Faculty of Science vide paper read (2) and recommended for the approval of the Academic Council.

3. The Regulations for Choice based Credit Semester System is implemented in this University vide paper read (3).

4. The Chairman, BOS in Botany (UG) vide paper read (4),forwarded the restructured scheme and syllabus of Botany Core, Complementary and Open Courses under Choice Based Credit Semester System, prepared by the Board of Studies in Botany(UG) for implementation with effect from 2009 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 scheme and syllabus of Botany Core,Complementary and Open Courses restructured in line with Choice Based Credit Semester System, with effect from 2009 admission***, subject to ratification by the Academic Council.

6. The restructured scheme and syllabus of Botany Core,Complementary and Open Courses under Choice Based Credit Semester System, implemented with effect from 2009 admission is appended.

7. The Scheme and Syllabus of Complementary Courses offered for this Programme will be available along with the syllabus of Core Courses of the Complementary subject.

8. The affiliated Colleges are not permitted to offer Complementary Courses in violation to the provisional/permanent affiliation granted by the University. Changes in Complementary Courses are permitted with prior sanction /revision in the affiliation order already issued in this regard.

9. If there is any inconsistency between the Regulations for CCSS and its application to the Scheme & Syllabus prepared, the former shall prevail.

10. Orders are issued accordingly.

Sd/-

REGISTRAR

To:

1. The Principals of Colleges offering B.Sc Botany Programme.
2. The Examination Branch (through PA to CE)

Copy To:

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

Forwarded/By Order

SECTION OFFICER

Appendix to U.O No Acad/C2/2471/2007(1) dated 08-07-2009.



KANNUR UNIVERSITY

Course Structure

and

Syllabus

FOR

UNDERGRADUATE PROGRAMME

IN

B O T A N Y

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

w.e.f 2009 ADMISSION

Course Structure

B.Sc Botany

SEMESTER 1

No	Title of the Course	Hours /week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (English)	4	3	3
3	Common Course (Additional Language)	4	4	3
4	Core Course 1	2	2	2
5	Core Course Practical	2	*	*
6	Complementary 1 (Course I)	4	3	3
7	Complementary 2 (Course I)	4	3	3

SEMESTER 2

No	Title of the Course	Hours/week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (English)	4	3	3
3	Common Course (Additional Language)	4	4	3
4	Core Course 2	2	2	2
5	Core Course Practical	2	*	*
6	Complementary 1 (Course II)	4	3	3
7	Complementary 2 (Course II)	4	3	3

SEMESTER 3

No	Title of the Course	Hours/week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (Additional Language)	5	4	3
3	Core Course 3	3	3	3
4	Core Course Practical	2	*	*
4	Complementary 1 (Course III)	5	3	3
5	Complementary 2 (Course III)	5	3	3

SEMESTER 4

No	Title of the Course	Hours/week	Credits	Exam hrs
1	Common Course (English)	5	4	3
2	Common Course (Additional Language)	5	4	3
3	Core Course 4	3	3	3
4	Core Course Practical	2	*	3
5	Complementary 1 (Course IV)	5	3	3
6	Complementary 2 (Course IV)	5	3	3

SEMESTER 5

No	Title of the Course	Hours / week	Credit	Exam hrs
1	Open Course 1	2	2	3
2	Core Course 5	3	2	3
3	Core Course 6	6	4	3
4	Core Course 7	4	3	3
5	Core Course 8	5	3	3
6	Core Course 9	5	3	3
7	Core Course 10 Practical	*	4	*

SEMESTER 6

No	Title of the Course	Hours / week	Credit	Exam hrs
1	Open Course 2	2	2	3
2	Core Course 11	5	2	3
3	Core Course 12	5	3	3
4	Core Course 13	3	2	3
5	Core Course 14	4	3	3
6	Core Course 15	4	3	3
7	Core Course 16 Practical II	*	4	*
8	Core Course 17 Practical III	*	4	*
9	Core Course 18 Project	*	2	*
10	Core Course 19 Elective	2	2	3

The Hour/Credit distribution for Complementary Theory/Practical examination shall be decided by the Board of Studies concerned.

Preface

The restructuring of undergraduate courses of Plant Science/Botany programme was done by the Board of studies in Botany (UG), Kannur University according to the proposal of the Kerala State Higher Education council. The Board has prepared the syllabi, model question papers and scheme of examination of fourteen core courses, four complementary courses and six open courses for Botany (UG) programme, while for Plant Science (UG) programme it is of fourteen core courses, four complementary courses, six open courses and three general courses.

The content of the core courses is reworked, taking all the core courses as one unit. An evolutionary link has been maintained throughout the subjects beginning with instrumentation and methodology, passing through origin and evolution of biodiversity and ending with ecology and conservation. Restructuring was done to make it contemporary and on par with the emerging concepts of twenty first century. It is so designed as to incorporate the new advances and trends in the disciplines within the limitations of the UG syllabus. That is why the Plant physiology course is split into Energy and Intermediary metabolism course and Physiology courses. While restructuring, the changes which have been incorporated in the plus two syllabus is also taken into consideration. The syllabus is designed according to semester pattern and choice based credit system. The remodeling of the syllabus makes it necessary to have an inter-disciplinary approach. The syllabus has focused to impart the latest concepts in Cell Biology and Molecular Biology.

The syllabus has been developed to arouse the curiosity of the students and inculcate in them a sense of spirit, wonder and appreciation to the dynamics of nature. The syllabus has been rewritten clearly and concisely so that the students should have knowledge to appreciate the environment, ecology and biodiversity aspects of plants when taken on a field trip.

Herbal science/medicinal botany in the core subject deals with the study of phytodrugs and substitute plants in Indian System of Medicine (alternative systems of medicine). It has been drafted to enrich the students with the identification of plants and phytodrugs. The study of Medicinal Botany and Economic botany enriches the Systematic Botany which can be utilized for botanical diagnosis of fragmentary crude drugs. This study will be useful in identifying medicinal taxa; since the students are aware of systematic botany (Morphology and Taxonomy of Flowering Plants).

The curriculum for B.Sc. programme in Botany which is of six semester duration contains in all fourteen core courses which earn 54 credits. During the first 4 semesters, 4 courses with 3 credits each are given, while during the 5th and 6th semesters, 10 courses are offered, each course with 2, 3 or 4 credits and a total of 3 practical courses are given. Each practical course is a four credit course. These fourteen core courses offered at the Undergraduate level are so designed to unfold gradually the unifying principles underlying the rich diversity of living beings and reveal the commonness among the organisms at molecular, organelle, cellular, tissue and organ levels and bio-chemical and genetic levels, so as to understand the unity of all living beings. A course on quantitative methods in biology is also incorporated in the beginning of the programme to give the basic knowledge of statistics needed for better understanding of various biological phenomena and biological systems. There is much greater emphasis on newly emerging areas. An option is provided for the

students to choose inter departmental electives in 5th and 6th semesters. While retaining the basic concepts of the subject, fourteen practical components are designed in correspondence with the theory courses to impart the skills and techniques required in these areas. Seminars, tutorials, quiz, assignments, field survey, project, study tour *etc.* supplement the programme of instruction relating to a unit.

Question paper patterns are prepared in such a way that they should probe the subject depth of students and make them think and apply what they have learnt through the syllabus instead of relying on memory and knowledge.

The syllabus will give a solid foundation for the post-graduate courses like Molecular Biology, Microbiology, Life Sciences, Medical Genetics, Horticulture, Computational approaches to protein/hereditary Science, Biodiversity and Taxonomy, Evolutionary Ecology and Environmental Conservation and Plant Biotechnology.

The enclosed syllabus includes 14 core courses, one departmental elective, three core practicals and one project for UG Botany programme and four complementary Botany courses and one complementary Botany practical course. The total number of inter departmental Botany open courses offered are six (out of which two have to be selected).

Sd/-
Dr. Kochuthresiamma Andrews,
Chairperson, BOS Botany (UG)

Scheme Botany(Core)

No	Semester	Course Code	Title of the Course	Hour/week	Credits
1	I	1B01BOT/ 1A14PLS	Methodology and Perspectives of Sciences	2+2	2
2	II	2B02BOT/ 2B01PLS	The Science of Botany-Methodology and Instrumentation	2+2	2
3	III	3B03BOT/ 3A13PLS	General Informatics & Bioinformatics	3+2	3
4	IV	4B04BOT/PLS	The Origin of Living Things: Biomolecules and Cell Biology	3+2	3
5	V	5B05BOT/PLS	Energy and Intermediary Metabolism	2+1	2
6	V	5B06BOT/PLS	Genetics and Molecular Biology	4+2	4
7	V	5B07BOT/PLS	Evolution, Paleontology and Plant Breeding	3+1	3
8	V	5B08BOT/PIS	Diversity of Life-1: Microbiology, Mycology, Phycology, Lichenology and Plant Diseases	3+2	3
9	V	5B09BOT/PLS	Diversity of Life-2: Bryology, Pteridology and Gymnosperms	3+2	3
10	V	5B10BOT/PLS	Core Practicals -1- Methodology, Intermediary Metabolism, Biochemistry, Cell Biology, Paleontology, Genetics and Bioinformatics.	*	4
11	VI	6B11BOT/PLS	Diversity of Life-3: Angiosperm Systematics and Morphology	2+3	2
12	VI	6B12BOT/PLS	Plant Form and Function-1-Angiosperm Anatomy and Reproductive Botany	3+2	3
13	VI	6B13BOT/PLS	Plant Form And Function-2: Plant Physiology	2+1	2
14	VI	6B14BOT/PLS	Biotechnology, Nanobiotechnology and Plant Tissue culture	3+1	3
15	VI	6B15BOT/PLS	Environmental Science and Phytogeography	3+1	3
16	VI	6B16BOT/PLS	Core Practicals -2- Microbiology, Mycology, Phycology, Lichenology, Bryology, Pteridology, Gymnosperms and Plant Pathology	*	4
17	VI	6B17BOT/PLS	Core Practicals-3- Angiosperm Anatomy, Angiosperm Morphology, Systematics, Reproductive Botany, Plant Physiology, Utility of plants, Medicinal Botany, Environmental Science, Biotechnology and Molecular Biology	*	4
18	VI	6B18BOT/PLS	Project work/field visit/study tour	*	2
19	VI	6B19BOT/PLS	Title of the Elective Courses	2	2
			1.Utility of Plants and Medicinal Botany		
			2.Plantation Botany		
			3.Nursery Management and Mushroom Cultivation		
			4.Ethnobotany		
			5.Pharmacognosy-		
6.Seed Technology					

Scheme Open Courses

No.	Semester	Course code	Title of the Course	Hour/ week	Credits
1	V	5D01BOT/PLS	1.Horticulture	2	2
			2.Mushroom cultivaton and marketing		
			3.Environmental Science		
2	VI	6D02BOT/PLS	4.Medicinal plants	2	2
			5.Forestry		
			6.Biotechnology		

Scheme Botany (Complementary)

No.	Semester	Course Code	Title of the Course	hours/ week	Credits
1	I	1C01BOT	Diversity of Life – Different Categories- Microbes, Fungi and Lichens- and Evolution of Plants	2+2	2
2	II	2C02BOT	Plant Diversity- Algae, Bryophyta, Pteridophyta, Gymnosperms and Angiosperm –Reproductive Botany	2+2	2
3	III	3C03BOT	Angiosperms–Morphological variations, systematics, Utility of plants and Plant pathology.	3+2	2
4	IV	4C04BOT	Plant physiology, Angiosperm anatomy and crop improvement	3+2	2
5	IV	4C05BOT	Complementary Botany practical -microbes, fungi, lichens, plant diversity, Angiosperm morphology, systematics, anatomy, pathology, physiology and crop improvement	*	4

.ELIGIBILITY TO APPEAR FOR PRACTICAL EXAMINATIONS

Submission of the following:

- 1.Certified Practical Record
- 2.Certified Herbarium sheets
- 3.Certified Field Book
- 4.Certified Tour Report
5. Project Report(Certified and Bonafide)
- 6.Collections as mentioned along with respective practical papers with a brief report
(Verify this Report on the specified day of Practical Examination.)

Assessment: External and Internal

End-semester Assessment	: 75%
Continuous Assessment	: 25%

**GENERAL SCHEME OF EXTERNAL EXAMINATIONS
(End-semester Assessment)**

Details of Papers	Duration of Exam	Weightage
Theory & Practicals		
Plant Science/ Botany (Core) courses	3 Hours	30
Botany-complementary courses	3 Hours	30
Botany -Open Courses	3 Hours	30

Project Work:

Each student must submit a duly certified report of a project work carried out by him related to the elective paper or any topic related to Botany at the end of the sixth semester. Topic of the project shall be given during the earlier semesters. The students may be grouped into different batches assigning projects of different topics. The project report may be certified by the supervising teacher and the Head of the Department.

Viva-voce:

The students are required to appear for a viva-voce during the practical examination of the sixth semester. Viva-voce will be based on the research methodology and the content of the project.

General Scheme of Questions for Theory Examinations of Core, Complementary and Open Courses of Botany/Plant Science Programme				
SECTION	TOTAL QUESTIONS	QUESTIONS TO BE ANSWERED	WEIGHTAGE TO BE AWARDED	TOTAL WEIGHTAGE FOR ALL QUESTIONS
A	5 bunches(5x4)	5 bunches(5x4)	1 x 5 = 5	5
B	6	4	1 x 4 = 4	6
C	7	5	1 x 5 = 5	7
D	8	6	2 x 6 = 12	16
E	3	1	4 x 1 = 4	12
Total	29	21	30	46

Sd/-

Dr.Kochuthresiamma Andrews
Chairperson, Board of studies, Botany (UG)

Core Courses

B.Sc. Botany/Plant Science**CORE – 1:****METHODOLOGY AND PERSPECTIVES OF SCIENCES****Course Code : 1B01 BOT/1A14PLS****No. of credits : 2****No. of contact hours : 72+18****Aim of the Course**

To introduce the methodology and perspectives of Science in general so as to enable the students to systematically pursue his particular discipline in science in relation to other disciplines that come under the rubric of sciences.

Objectives of the Course

- To learn the fundamental characteristics of science as a human enterprise
- To understand how science works
- To apply scientific methods independently

Course Outline**Module I- Science and Science Studies****12Hrs**

Types of knowledge: practical, theoretical and scientific knowledge, information. What is science; what is not science; laws of science, Basis for scientific laws and factual truths.-Science as a human activity, scientific temper, empiricism, vocabulary of science, science disciplines.-Revolutions in Science and Technology.

Module II- Methods and Tools of Science**15Hrs**

Hypotheses; theories and laws in science; Observations, evidences and proofs-Posing a question; formation of hypothesis; Hypothetico-deductive model, Inductive model. Significance of verification (proving)-corroboration and falsification (disproving)-auxiliary hypothesis-adhoc hypothesis- Revision of scientific theories and laws-Importance of Peer Review

Module III- Experimentation in Science**18Hrs**

Design of an experiment- experimentation-observation-data collection- interpretation and deduction-Necessity of units and dimensions-repeatability and replication-Documentation of experiments-Record keeping.-Connection between measurements and underlying theory-Types of Experiments-Experiments to test a hypothesis-to measure a variable or to gather data by preliminary and explorative experiments-Planning of experiments- Design-selection of controls-observational requirements,-instrumental requirements-Scientific Instruments-Sensory extension- choice and selection of instruments-sensitivity of instruments- Accuracy and precision and errors-Types of instrumentation-Historical development and evolution of scientific instruments-Robotics- (*Only a general orientation of scientific instruments required*)-Making observations- direct and indirect observations-controlled and uncontrolled

observations-human and machine observations- human error-Examples of great experiments in science. (To illustrate how various tools were applied to answer a question).

Module IV– Data handling

18 Hrs

Documentation of experiments-Nature and types of data- typical examples-Data acquisition- Treatment of data-Data interpretation- Significance of statistical tools in data interpretation-errors and inaccuracies-Data presentation: graphs, tables, histograms and pi diagrams. Statistical testing of hypothesis-null hypothesis- Significance test-Statistics based acceptance or rejection of a hypothesis. Deduction of scientific correlation- patterns and trends.

Statistical terms – Population, Sample, Unit, Variable, Constant, Parameter- Data-Inference-Accuracy and precision- Role of Biostatistics in modern Research – Application of Biostatistics- Measures of Central tendency-Arithmetic Mean-Median-Mode- Measures of Dispersion–Range, Standard deviation, standard error-Correlation and Regression – brief account only; Analysis of variance ANOVA – brief account only; Regression analysis – brief account only.

Module V– Ethics in science

9Hrs

Ethics in Science- Scientific information-Repositories of scientific information-primary, secondary and digital sources-. Sharing of knowledge-transparency and honesty-danger of preconceived ideas-Reporting of observational and experimental data-human bias-Biased observations- Influence of observer on observations- using and acknowledging observations by others-Publications and Patents (Details not required)- Concepts of IPR, copyrights and patents-Plagiarism.

Practicals

18 Hrs

1. Work out problems on measures of central tendencies, measures of dispersion.
2. Measurement of specimens using micrometer.
3. Photomicrography and camera lucida drawings.
4. Familiarizing with different biological instruments.
5. Collection, identification and submission of plants using different preservation methods.

Reference Books

1. Collins H. and T. Pinch, *The Golem: What You Should Know About Science*, Cambridge University Press, 1993.
2. Giceryn, T.F. *Cultural Boundaries of Science*, Univ. Chicago Press, 1999.
3. Hewitt, Paul G., Suzanne Lycons, John A.Suchocki and Jennifer Yeh, *Conceptual Integrated Science*, Addison-Wesley, 2007.
4. Kothari C.R.(2008) *Research Methodology: Methods and technique*, New age International, new Delhi
5. Lee J.A (2010), *The Scientific Endeavour: Methodology and Perspectives of Sciences*, Dorling Kindersley India Pvt. Ltd., New Delhi.
6. Newton RG. *The Truth of Science*: New Delhi, 2nd edition Bass, Joel, E. et al., *Methods for Teaching science as Inquiry*, Allyn & Bacon, 2009.

B.Sc. Botany/Plant Science**CORE – 2:****THE SCIENCE OF BOTANY-METHODOLOGY AND INSTRUMENTATION**

Course Code : 2B02 BOT/2B01PLS

No. of credits : 3

No. of contact hours : 90hrs (54+36)

Aim & Objectives

1. To enable the students to appreciate the scientific facts and principles discovered by other scientists in the field of Plant Science.
2. To train them in the use and maintenance of scientific equipment in biology.
3. To develop in them the scientific way of doing and making them understand that there are many models of experimentation that are possible.
4. To train them in the process of the methodology of biological science

Module-1 The nature and logic of biological sciences-**9Hrs**

Biology is the science of life. Scientist form generalizations from observations -The scientific method.- Elements of scientific method -inductive and deductive logic- The application of logic –a case study-computational approaches.

A case history of scientific experimentation (The discovery of DNA) –hypothesis and development- predictions from the hypothesis- experiments-testing and improvement-confirmation- Early history and development of methods in Biology- Development of the microscope as an example- Man's use of biology-past, present and future -Revolutionary changes in biology- Research in biology-Historical perspective -Pure and applied bioscience.

Module-2 Major Generalizations in Biology. 7Hrs

The cell concept-the gene concept- The continuity of the germ plasm-Evolution-molecular foundation in biology-biological inter relation-the mechanism and vitalism and natural selection. A general discussion on the evolution of molecule to organism-classification.

The science of botany-Botany as a science-method of science-experimental and descriptive.-the facts of science.-botany and other sciences.-development of botany-scope of botany.-contributions of botany-plants and world affairs -plants as living things-A brief survey of major plant groups.

Module 3 Experimental Designs in Botany 7Hrs

Research methodology.-different from other disciplines.-Biological abstracts- Planning of experiments: Design, selection of controls, observational requirements, instrumental requirements-experimental errors- Experimental designs in Botany (Enable students to plan experiments of their own in different fields.)

Module4 Biological Instrumentation and methodology**25 hrs**

History and development- an overview

Methods in Cell Biology-Microscopy and Microtechnique

Introduction- Light microscope- compound microscope- -the instrument. The optics of the instrument -magnification, resolution. - objective lenses- ocular lens- aberration of lenses-visibility- preparation of specimens – Whole mounts, Maceration, Cytological methods- Smear and squash preparation - Killing and fixing agents- Carnoys formula, Farmers formula and F.A.A-.Dehydration – reagents-.Sectioning- hand and microtome.- rotary and sledge- Stains and staining techniques- double staining. Common stains- saffranin, haematoxylin, acetocarmine.-Mounting media- D.P.X. and Canada balsam.

Phase contrast microscopy- Fluorescence microscopy-videomicroscopy and image processing- photomicrography-camera lucida drawing- Electron microscopes-SEM, TEM, AFM - Micrometry- colony counter.

Methods in Molecular biology and Biochemistry.

Cell culture- Sterilisation methods - Autoclave, Laminar air flow, uv irradiation- fractionation of a cell's contents-differential centrifugation- Instrumentation and principle of Homogenizer and Ultrasonicator- isolation, purification and fractionation of proteins- Separation techniques- Centrifuge, Chromatography and electrophoresis-PAGE- isoelectric focusing- protein/nucleic acid measurement and analysis- 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

Preservation methods-Lyophilisation, Cryopreservation, Herbarium technique, Formaldehyde or FAA/Whole mounts.

Palynology techniques-Acetolysis of pollen grains

Methods of Plant breeding -Hybridisation techniques

Module 5- Biology-Ethical ,legal and social issues**6Hrs**

Social issues - public opinions against the recombinant technologies.-Biodiversity and farmer's rights; Legal issues – legal actions in the field of agriculture- and on patent rights- biosafety regulations; Ethical issues – ethical issues against the molecular technologies. –stem cell research-cloning- genetic testing in humans-Bioethics – Necessity of Bioethics, different paradigms of Bioethics – National & International issues.-Patenting life forms.

Practical**Total hours – 36**

1. General awareness of Micro technique - maceration, smears & squash
2. Demonstration of microtome sectioning and hand sectioning
3. Separation of plant pigments by paper chromatography.
4. Demonstration of Emasculation and Hybridization, budding, grafting and layering.
5. Study of pollen morphology of the following plants –*Hibiscus*, *Vinca*, *Balsm*, *Ixora*, *Crotalaria*, *Bougainvillea*.

6. Acetolysis of pollen grains
7. Preparation of buffer.
8. Measurement of pH.
9. Construct the absorption spectrum of any sample.
10. Visit to Laboratories.

REFERENCES

1. Bajpai, P.K. (2008) Biological instrumentation and methodology, S. Chand and company Ltd, .New Delhi.
2. Carl L. Wilson and Walter .E. Loomis. (1970) Botany (5th Edn.) Holt, Rinehart and Winston, Inc.
3. Casey E. J. - Biophysics – Concepts and Mechanics Van Nostrand Reinhold Company.
4. Galen .W. Ewing - Instrumental methods of chemical analysis Mc - Graw Hill Book Company
5. Graeme D.Ruxton and Nick Colegrave(2006) Experimental design for the life sciences(2nd Edn.) Oxford university press
6. James H.Otto and Albert Towle(1973) Modern Biology Holt,Rinehart and Winston, Inc.
7. Jeffrey J.W.Baker-Garland.E.Allen(1968)-The study of biology-Addison-wesley publishing company-Reading,Massachusetts.
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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
12. Shaleesha A Stanley. 2008 Bioethics, wisdom education service-Chennai.
13. Singh, B.D. (2004) Biotechnology: Expanding horizons, Kalyani publishers, New Delhi.
14. Vandana Shiva and Ingunn Moser(1996) ; Bio politics Feminist and ecological Reader on Biotechnology; Orient Longman.
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Code:

Reg. No:

Name :

KANNUR UNIVERSITY EXAMINATION**Theory -Plant Science/Botany Model Question Pap****CORE COURSE – 2****2B02 BOT/2B01PLS-THE SCIENCE OF BOTANY - METHODOLOGY AND INSTRUMENTATION****Time: 3 Hours****Total Weightage: 30***Draw diagrams wherever necessary***Section - A***Answer All***(Questions in bunches of four; Each bunch carries a weightage of 1)****1. Choose the correct answer**

- i) The amount of light absorbed by a material is proportional to the concentration of the absorbing solution is referred as -----
 - a) Beer's law
 - b) Boger-lambert law
 - c) Poiseuille's law
 - d) all of the above
 - ii) The first patented life form belongs to the kingdom
 - a) Plantae
 - b) Monera
 - c) Protista
 - d) Animalia
 - iii) The ratio of diameter of lenses to its focal length is referred as -----
 - a) Magnification
 - b) Resolution
 - c) Numerical aperture
 - d) none of the above
 - iv) From the following experimentally obtained observations regarding mineral nutrition in plants, draw a conclusion as to the factor or factors necessary for the development of chlorophyll in green plants.
- 2** i) Each division of stage micrometer equal to -----
 - a) 0.01mm
 - b) 1 μ m
 - c) 0.1mm
 - d) None of the above
- ii) _____ controls the intensity of light entering in microscope.
 - a) Iris Diaphragm
 - b) Mirror
 - c) Condenser
 - d) All of the above
- iii) In paper chromatography which of the following act as a stationary phase
 - a) water
 - b) cellulose

- c) organic solvent
d) none of these
- iv) The finding that there was little or no water within the DNA molecule led Watson to build the correct structure of DNA. Who among the following scientist correctly spotted the mistake concerned with water content?
- a) Linus Pauling b) Maurice Wilkins
c) Rosalind Franklin d) Erwin Chargaff

3. State true or false

- i) An observational investigation does not generally start out with a hypothesis
ii) The concept of partition coefficient is the basic principle of all chromatographic methods.
iii) DPX is a killing and fixing fluid.
iv) PAGE stands for Polyadenylamide gel electrophoresis

4. Fill in the blanks

- i) The technique of isoelectric focussing was discovered by.....
ii) The most widely used apparatus for the determination of radioactive isotopes is.....
iii) The unit of sedimentation coefficient is known as

- iv) For studying the external morphology of pollen grains,technique is commonly used.

5. The following are nobel prize winners .Rearrange column B and C to match column A .

Frederike Zernike	PCR	1986
Earnst Ruska	Phase contrast microscopy	1903
Kary Mullis	Radio activity	1953
Atoine Henry Becquerel	TransmissionElectron Microscope	1993

Section -BAnswer any *Four***Differentiate the following: Each question carries a weightage of 1)**

6. Pure and applied bioscience
7. Carnoys formula and Farmers formula
8. magnification and resolution of a light microscope.
9. farmers right and patent right
10. inductive and deductive logic with examples in life science.
11. Stage micrometer and ocular micrometer

Section CAnswer any *five***(Short answer questions; each question carries a weightage of 1)**

12. Give an account of the experemental Designs in Biology with an example..
13. Why must a scientist be careful not to extend his experimental conclusions in organisms other than those with which he worked?

14. What is meant by 'continuity of the germ plasm'?
15. List out the various methods used for sterilization of equipments and media
16. Define transmittance and absorbance. what is the difference between these two and how they are related to each other?
17. What do you mean by a phase contrast? How this phenomenon is useful to a biologist?
18. What do you mean by histochemistry and give a list of atleast four stains with the type of tissue component stained by each of them?

Section D

Answer any *Six*

(Short essay- type questions; each question carries a weightage of 2)

19. Discuss the way in which progress in biology has paralleled the perfecting of the Microscope.
20. What are buffers? Give an account of their application in biological systems and research.
21. Discuss the principle and technique of Gas liquid Chromatography
22. What is herbarium? Describe the technique of preparation of herbarium specimen.
23. Give a historical perspective of research in Botany
24. Discuss the condition under which natural science originated, including factors that may have influenced the development. Give a brief account on the contribution of life science.
25. What is the cell concept as we understand it today? What did the following men contribute to the development of the cell concept:
(a) Matthias Schleiden? (b) Theodor Schwann? (c) Rudolf Virchow?
26. Give protocols of single and double staining studied by you.

Section E

Answer any **One**

(Essay- type questions; Each question carries a weightage of 4)

27. A plant physiologist observed the following deficiency symptoms in a plant . Leaf Necrosis, Leaf Chlorosis, Poor flowering and fruiting and Shedding of leaves

Devise a hypothesis to explain each of the above observations. Then Design an experiment or experiments to test your hypothesis,

28 (a) Why certain substances or solutions appear to have a particular color? How this property is useful in estimating the concentration of such substance in a solution? (b) Explain the principle, technique and application of centrifugation in biology.

29. Describe the various steps involved in the preparation of a permanent serial section.

B.Sc. Botany/Plant Science**CORE - 3****GENERAL INFORMATICS & BIOINFORMATICS****Course Code : 3B03BOT/3A13PLS****No. of credits : 3****No. of contact hours : 54+36****Aim of the Course**

To update and expand basic informatics skills and attitudes relevant to the emerging knowledge society and also to equip the students to effectively utilize the digital knowledge resources for their chosen courses of study.

Objectives of the Course

- To review the basic concepts & functional knowledge in the field of informatics.
- To review functional knowledge in a standard office package and popular utilities
- To create awareness about nature of the emerging digital knowledge society
- To create awareness about social issues and concerns in the use of digital technology
- To create awareness about major informatic initiatives in India and Kerala
- To impart skills to enable students to use digital knowledge resources in learning.

Course Outline**Module I - Overview of Information Technology (10 Hrs)**

Features of the modern personal computer and peripherals, computer networks & Internet, wireless technology, cellular wireless networks, introduction to mobile phone technology, introduction to ATM purchase of technology, License, Guarantee, Warranty, overview of Operating Systems & major application software.

Module II - Knowledge Skills for Higher Education (10 Hrs)

Data, information and knowledge, knowledge management- Internet access methods – Dial-up, DSL, Cable, ISDN, Wi-Fi - Internet as a knowledge repository, academic search techniques, creating cyber presence, case study of academic websites, open access initiatives, open access publishing models. Basic concepts of IPR, copyrights and patents, plagiarism, introduction to use of IT in teaching and learning, case study of educational software, academic services-INFLIBNET, NICNET, BRNET.

Module III - Social Informatics (10 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-localization issues- Unicode- IT and regional languages 1

Module IV - IT Applications (10 Hrs)

e-Governance applications at national and state level, IT for national integration, 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 V-Bioinformatics

(14 hrs)

Bioinformatics -Introduction, scope and fields of application. Protein Data bank (3D protein structure) Data retrieval tools and methods-NCBI- Entrez , SRS .Data base searches for homologous sequence- Fasta, Blast. Phylogenetic analysis (Phylip), Protein prediction, similarity search and gene finding.

Practicals -

36 Hours

1. Identification of common computer peripherals used in PC.
2. Create, Copy and Save a document with Header, Footer, Page No., Date & Time using any software.
3. Insert a table in the above document.
4. Prepare the mark list of students using any applicable software.
5. Create five slides using any applicable software, with different design templates.
6. Students are expected to work with at least any one of the commercial/ scientific packages, to explore the WEB and able to find, recognize, download, install and use software in various areas useful to the research of Biology.

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22. Vijaya lakshmi & Pai & Rajasekar Nair, *Neural network*.
23. Wunschiers, R. *Computational Biology* (Springer)

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/?Understanding-The-Operation-Of-Mobile-Phone-Networks&id=68259>
<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>

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KANNUR UNIVERSITY EXAMINATION
Botany -Theory Model Question Paper

Core course- 3

3B03BOT/3A13PLS -GENERAL INFORMATICS AND BIOINFORMATICS**Time: 3 Hours****Total Weightage: 30****Section - A****Answer All****(Questions in bunches of four; each bunch carries a weightage of 1)****1. Choose the correct answer**

- i) The program which compares an amino acid sequence against a protein sequence database.
 a) Blast n b) Blast p c) Blast x d) t Blast n
- ii) Which one is a 3D structure database?
 a) PDB b) Swiss-prot c) Genbank d) DDBJ
- iii) Operating system is
 a) A collection of hardware components c) A collection of software routines
 b) A collection of input-output devices d) none of the above
- iv) URL stands for
 a) Universal Record Linking b) Uniform Resource Locator
 c) Universal Record Locator d) Uniformly Reachable Links

2. Write 'True or False'.

- i) Boot strapping strategies are used for predicting sequence patterns.
 ii) The language that the computer can understand and execute is called Machine language
 iii) Gaps in alignments can be thought of as representing mutational changes in sequences.
 iv) Spam is an anonymous, unsolicited bulk email.

3. Fill in the blanks

- i) In phylogenetic evaluation, sequences which are assumed to be derived from a commonsequence
 ii) are the protein coding regions in a gene sequence
 iii) Information is stored and transmitted inside a computer in.....form.
 iv) A network that spans a large city is known as

4. Match the following

A	B
Maximum Parsimony	KEGG
Expasy	Molecular Visualization tool
Phishing	Distance Method
Rasmol	Cyber threats

5. Answer in one word or in one sentence

- i) Wi-Fi.
 ii) DDBJ.
 iii) OMIM
 iv) Unicode

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. Web browser & Search engine
7. Virus & Worms
8. System software & Application software
9. t Blast n and t Blast x.
10. LAN & WAN
11. CATH and SCOP

Section CAnswer any *Five***(Short answer questions; each question carries a weightage of 1)**

12. What is the significance of multiple sequence alignment?
13. What is e-Governance? Explain its application at national level?
14. Explain Dot matrix analysis and Dynamic programming algorithm
15. What are the advantages of computer network?
16. Why is the importance of Cyber law?
17. What is a Firewall?
18. What do you mean by Bio-Computing?

Section DAnswer any *Six***(Short-essay questions; each question carries a weightage of 2)**

19. Define the steps for multiple sequence alignment.
20. Explain the working of ATM?
21. Explain the role of IT in Teaching?
22. List the different programs in Blast and mention the use of each program.
23. Explain various categories of Cyber Crimes?
24. Write a note on IPR?
25. What are the applications of Artificial Intelligence?
26. Mention the use of the software FASTA and define the features available in this software.

Section EAnswer any *one***(Long-essay type questions; each question carries a weightage of 4)**

27. Define the term Bioinformatics and its various fields of application?
28. Explain various Internet access methods?
29. Define the concept of Evolutionary trees and describe the four methods used for the prediction of evolutionary trees.

B.Sc. Botany/Plant Science**Core-4****THE ORIGIN OF LIVING THINGS- BIOMOLECULES AND CELL BIOLOGY****Course Code : 4B04BOT/PLS****No. of credits : 3****No. of contact hours : 54+36****Aim and objectives**

- 1) To make the students aware of the way by which life originated and how animate and inanimate matter differ each other with same types of molecules
- 2) To impart up-to-date knowledge in the field of biochemistry and cell biology
- 3) To create in them a scientific approach in understanding nature and its evolution, beginning with atoms to its complexity through the cell.
- 4) To enable them to appreciate the way scientists work in understanding evolution and the organization of cell.
- 5) To understand the mechanism of cell reproduction and its biological consequences.

Course Outline**Module 1 Organization of living things-hierarchical organization (5hr)**

Life at the molecular level-Biochemistry and the living state - The nature of molecules- Atoms are nature's building material-Chemical Bonds- Molecules and life- Water- the cradle of life- Physical properties- explanation- Hydrogen bonding of water- examples of benefit to life-Molecular logic of living organisms-Biomolecules and cells-Chemical composition of biomolecules and its evolution.-Pathway of Discovery-Experimental test of Prebiotic synthesis by Alexander Oparin- The primordial biomolecules- The origin of biomolecules-The fitness of biomolecules.- Hierarchy of Biomolecules (Organelles-supramolecular assemblies-macromolecules-Building block bio molecules-metabolic intermediates-precursors)

Module 2 - The chemical building blocks of life-molecules**18hrs****Carbon: The frame work of biological molecules.**

Carbohydrates:store energy and provide building material.-Classification-structure and function of monosaccharide, oligosaccharides and polysaccharides-synthesis of glycosidic bonds-enzymatic hydrolysis-Amylases and Invertases

Proteins:perform the chemistry of the cell.-Classification-properties-structure - Aminoacids - the building blocks of proteins - Classification based on polarity-structure-Amphoteric property of amino acids-peptide formation-Pathways of discovery-William C.Rose and the discovery of threonine-Three dimensional structure of protein-Molecular configuration and conformation-Biological function of proteins- Role of Bonds in stabilising protein structure.Denaturation and renaturation-Pathways of discovery-Linus Pauling and structural biochemistry(Ref-Voet & voet).

Nucleic acids store and transfer genetic information-Structure of nucleotides-purines and pyrimidines- Functions of nucleotides and nucleotide derivatives-ATP, NAD, NADP, FAD, FMN, cyclicAMP, cyclicGMP; Nucleic acids - DNA and RNA.
Lipids-make membranes and store energy – Classification- Complex lipids, Simple lipids-

Storage and structural lipids; Fatty acids- saturated and unsaturated- triacyl glycerols- phospholipids and sphingolipids-lipids in membranes.

Secondary metabolites-A brief survey –Physiological role- significance.

Module 3 - The origin and early history of life. (4hrs)

The time scale of Chemical and Biological evolution- Conditions leading to the Abiotic origin of Organic compounds -Prebiotic condensing agents.-Prebiotic formation of polypeptides-the prebiotic origin of enzymatic activity- prebiotic origin of Nucleotides and nucleic acids -Miller-Urey experiment.-RNA -the first living molecule. All living things share key characteristics. What is life?-fundamental properties.

Module-4- Biology of the Cell (4hrs)

All organisms are composed of cells-The origin of life verses the origin of cells. – Oparin's bubble hypothesis-protobionts-current thinking-the earliest cells. The origin of Prokaryotes and Eukaryotes- Introduction to the study of cell biology-The Discovery of cells-cellular properties and organization- size of cells-visualizing cells- History of the Progress of cell Biology-the Development of the cell theory- pre cellular evolution-Modern cell Biology- Evolution of prokaryotic and Eukaryotic cells. General Organisation of prokaryotic cells.

Module-5 Eukaryotic cell (10hr)

Morphological Diversity of Eukaryotic cells. Ultra structure and function of the following cell components and organelles:**Cell wall**:protection and support-A net work of cellulose microfibrils and a matrix-primary and secondary wall-Plasmodesmata- **Plasma membrane**-fluid layers of lipid-Unit membrane -Ultra structure-fluid mosaic model- lipid bilayer- membrane proteins – membrane channels- functions -**Cytoplasm**- physical and biological properties

Nucleus: information centre for the cell- ultrastructure of the interphase nucleus-The nuclear envelope:getting in and out-Nuclear pore-pore complex-chromosomes-nucleolus:manufactures ribosomal subunits-**Endomembrane system-Endoplasmic reticulum**:compartmentalizing the cell- **rough ER**:manufacturing proteins for export-biogenesis- **Golgi apparatus** :delivery system of the cell- **Vesicles**: **Enzyme store houses**-Lysosomes:intracellular digestion centres- polymorphism- composition- lysosomal enzymes-Microbodies-Peroxisomes, glyoxysomes- **Ribosomes**: sites of protein synthesis- Eukaryotic, prokaryotic mitochondrial and chloroplast ribosomes- Chemical composition of ribosomes-Dissociation and Reassociation during protein synthesis-Biogenesis of ribosomes-**Organelles that contain DNA**- **Mitochondria**:cell's chemical furnaces- **Chloroplasts**: where photosynthesis takes place- different types of plastids-structure, position, function–endosymbiosis-origin and general organization of mitochondria and chloroplasts with reference to their functions- **Cytoskeleton**:interior framework of the cell-Actin filaments, microtubules, intermediate filaments- **Centrioles**: microtubule assembly centres –cell movement-**Vacuoles**: a central storage compartment.

Module-6 (9Hrs)

Chromosomes: packaging the DNA- Chromosomal shape is determined by the position of the centromere- Chromosomal nomenclature- Chromatid, centromere, telomere, satellite, secondary constriction, nuclear organiser.-Karyotype-All the characteristics of a

chromosomal set.-Each chromosome has a single DNA molecule-Chromatin reticulum-Heterochromatin and Euchromatin- Chromosome morphology- fine structure,chemical organisation-organisation of DNA-Nucleo proteins-Chromatin is a complex of DNA and Histones- Nucleosomes- Satellite DNA -polytene chromosomes,Lamp brush chromosomes-B chromosomes-C-value paradox.

Chromosome mutation

Structural aberration. - Deletion, Duplication, inversion and Translocation

Numerical aberration-Aneuploidy-Monosomy-Trisomy-nullisomy

Euploidy- Polyploidy.- Haploidy

Human abnormalities due to alterations in chromosome number-Hereditary defects – Phenotypic effects-Cri-du-chat syndrome-Turner syndrome, Down syndrome, Klinefelter syndrome.

Module 7 - Cell Cycle

(4hrs)

Five phases- Interphase: preparing for mitosis (G_1 , S and G_2), Mitosis (M) and Cytokinesis (C) - duration of the cell cycle- cell cycle is genetically regulated.

Mitosis (M) is a key phase of the cell cycle.-**Prophase:** formation of the mitotic apparatus- **metaphase:** alignment of the centromeres- **anaphase:** separation of the chromatids – **telophase:** reformation of the nuclei -Molecular organization and functional role of the mitotic apparatus- The Spindle-Centromere-Anaphase chromosome movement-Hypothesis about the mechanism of chromosome movement.-Significance of mitosis. **Cytokinesis (C): actual division of the cell-** cytokinesis in animal cells, plant cells, fungi and protista.

Practicals

(36Hrs)

1. To prepare molar, molal, normal and percent solutions.
2. Qualitative test for carbohydrate, aminoacid and protein
3. Quantitative test for sugar in a given solution
4. Quantitative test for sugar in biological samples
5. Estimation of protein and DNA
6. Chromatographic methods for the separation of macro and micro molecules
7. To Make acetocarmine squash preparation of onion root tips and to identify different stages of mitosis

References

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KANNUR UNIVERSITY EXAMINATION
Botany -Theory Model Question Paper

Core-4**THE ORIGIN OF LIVING THINGS- BIOMOLECULES AND CELL BIOLOGY****Course Code: 4B04BOT/PLS****Time: 3 Hours****Total Weightage: 30****Section - A****Answer All****(Questions in bunches of four; each bunch carries a weightage of 1)****1. Choose the correct answer**

- i) Which of the following shows the correct hierarchy in the molecular organisation of cells
 (a) Metabolic intermediates-Building blocks-Macro molecules-Supra molecular assemblies
 (b) Organelles--Building blocks- Macro molecules-Precursors from the environment
 (c) Precursors from the environment- Metabolic intermediates-- Macro molecules- Building blocks
 (d) Building blocks- Macro molecules-Precursors from the environment-Supra molecular assemblies
- ii) No cell is known to be without
 a) Mitochondria
 b) Chloroplast
 c) A well defined nucleus
 d) Ribosome
- iii) The size of Mitochondria is
 a) 5 - 20 μ ,
 b) 50 -100 μ
 c) 0.5 – 1.0 μ
 d) 150-300 μ
- iv) Which structure alone cannot be observed with light microscopy?
 a) Vacuole
 b) Microfilament
 c) Cell wall
 d) Plastid

2 . i) Which of the following gases was not prevalent in abundance in the atmosphere of early earth, but became more prevalent after living organisms (mostly phototrophs) evolved?

- a.) oxygen b. nitrogen c. methane d. ammonia

ii)The cytoskeleton of a cell is comprised of:

- (a) cell wall and membranes
 (b) nucleus and cytoplasm
 (c) microtubules and microfilament
 (d) intrinsic and extrinsic proteins

iii). Which chemical below would you not find in a phospholipid?

- a) C b) O c) H d) N

iv) Which are the most diverse molecule in the cell

- (a)carbohydrates

- (b) protein
(c) lipids
(d) Mineral salts

3. State true or false

- i) Klinefilters syndrome is due to the addition of one extra chromosome to the normal cell.
ii) Sucrose is not a reducing sugar
iii) Celulose and amylase are made up of glucose monomers
iv) Ribosome is a non-membrane organelle:

4. Fill in the blanks

- i) The number of chromosomes in Drosophila melanogaster is -----
ii) When there are $2n+2$ chromosome in a cell ,the condition is known as -----
iii) Bond angle of H-O-H is ----
iv) The glycosidic bond involved in the branch point of amylopectin is-

5. Rearrange column B and C to match column A

	A	B	C
i)	polysaccharide	carbon, hydrogen, oxygen as enzymes, hormones, pigments	nucleotide
ii)	fat	carbon, hydrogen, oxygen, nitrogen, phosphorous directs protein synthesis	amino acid
iii)	protein	carbon, hydrogen, oxygen in a 1:2:1 format immediate source of chemical energy	glucose
iv)	nucleic acid	hydrogen, oxygen, carbon, nitrogen,occasionally sulfur comprise parts of membranes, reserve source of chemical energy	glycerol

Section B

Compare and contrast any four: (Each question carries a weightage of 1)

- 6 a) NAD and FAD
7 Reducing and Non reducing sugar
8 sphingo lipids and phospho lipids
9 a) Paracentric and pericentric inversion
b) chromosome and chromatid
10 primary and secondary cell walls.
11 eukaryotic and prokaryotic cell.

Section C**(Short answer questions. Answer any five; each question carries a weightage of 1)**

- 12) Describe the general structure of a nucleotide
- 13) What are terpenes chemically, and how are they synthesized? Give one example each of mono- and triterpenes that serve as feeding deterrents to insects.
- 14) Classify amino acids based on polarity
- 15) For a species with a diploid number of 18, indicate how many chromosomes will be present in the somatic nuclei of individuals who are haploid, triploid, tetraploid, trisomic and monosomic
- 16) What are the basic points of A.I. Oparin's idea concerning the origin of the Universe/Solar System?
- 17) Give an account of the organisation of interphase nucleus
- 18) Compare the components of ribosomes in prokaryotes and Eukaryotes..

Section D**Short answer questions.****Answer any six; each question carries a weightage of 2.**

- 19) Living things are composed of lifeless molecules. But they show extra ordinary attributes not shown by inanimate matter. Comment on the molecular logic of the living state.
- 20) Compare and contrast the particulars of the early earth and the current earth with respect to the types of molecules that were prevalent. Why is early earth sometimes described as a "nitrogenous or primordial soup". List two experiments to show that life could have originated from inorganic components
- 21) Draw the metaphase and anaphase stages of mitosis of a species with the data given below. $2n=6$, in which one pair of chromosome is metacentric, one pair telocentric and one pair submetacentric. The A, B and C loci each segregating a dominant and recessive allele (A and a, B and b, C and c) are each located on different chromosome pairs.
- 22) Draw a diagram of a higher plant chloroplast labeling the inner and outer envelope membranes, the thylakoid membranes, the stroma and the grana stacks. Indicate which membranes contain proteins of the photosynthetic electron transport chain and proteins associated with ATP synthesis.
- 23) Explain the morphology and chemical organization of chromosome.
- 24) Mitosis is the mere separation of an already duplicated cell. Evaluate the statement.
- 25) Discuss the main functions of secondary metabolites in plants and relate these functions to the sites of accumulation of secondary compounds in the plant.
- 26) Draw and label a diagram of a biological membrane which illustrates the fluid mosaic model of membrane structure. Clearly indicate the phospholipids, the hydrophilic head groups, the lipophilic tails, intrinsic proteins, extrinsic proteins, attached carbohydrate moieties.

Section E (Essay type question. Answer any one; each question carries a weightage of 4)

- 27) Distinguish between the primary, secondary and tertiary structure of protein.
Discuss the role of bonds in stabilising protein structure

B.Sc. Botany/Plant Science**CORE-5****ENERGY AND INTERMEDIARY METABOLISM****Course Code: 5B05BOT/PLS****No. of credits- 2****No. of contact hours- 36+18****Aim of the Course**

To understand the interrelationships existing between metabolic pathways

Course Outline**Module-1 Dynamics of Energy Transformation****9hrs**

The laws of thermodynamics describe how energy changes- Bioenergetics and thermodynamics-Entropy-Free energy change and equilibrium constant-Activation energy-Phosphate group transfer-Biological oxidation–reduction reactions - flow of electrons.-Energy currency of life -Discovery and structure of ATP-High Energy phosphate Bond - Hydrolysis of ATP-ATP-ADP Reactions-ATP-ADP-AMP interactions.Role of ATP in Biological reactions
Chemical life of a cell - Survey of intermediary metabolism- anabolic-catabolic-amphibolic pathways-Interrelationship of metabolic pathways-Regulation of metabolism
Enzymes-biological catalysts-General properties- nomenclature-Substrate specificity - cofactors and co enzymes-Enzyme kinetics-mechanism of Enzyme action-Factors influencing rates of Enzymatic reaction-Effect of PH on enzyme activity-substrate concentration-temperature- Enzyme inhibition-competitive and non competitive inhibition-Allosteric regulation of enzyme activity-Pathways of discovery-J.B.S.Haldane and Enzyme action(Ref.Voet ,voet& pratt 2nd Edn :363)

Module -2 Capture of energy**(9Hrs)**

Photosynthesis- Milestones in the history of photosynthesis – the chloroplast as a photosynthetic machine- role of soil and water-role of light and reducing power-pigments capture energy from sunlight-The biophysics of light- Light phase of photosynthesis-Absorption spectra and pigments- chlorophylls and carotenoids- Photochemistry and transfer of excitation energy-phosphorescence and fluorescence- Action Spectra-photosystems-photosystems convert light to chemical energy- Photophosphorylation-cyclic and non cyclic-Electron transport-Redox potential of the electron carriers.

Calvin cycle-cells use the energy and reducing power to make organic molecules-Carbon Dioxide Fixation and Carbohydrate Synthesis- Products of carbon dioxide fixation-Pathways of Discovery-Exploring the path of carbon in photosynthesis-(1)JamesA.Bassham(2)MelvinCalvin(Ref.Plant physiology; Salisbury and Ross;4e) The C-4 Dicarboxylic pathway-Some species fix CO₂ differently-Photorespiration-CO₂ fixation in succulent species(Crassulacean acid metabolism)-formation of sucrose,starch and Fructans.Factors influencing photosynthesis

Module 3 - Plants and nitrogen metabolism**6hrs**

Biological Nitrogen fixation-symbiotic and a symbiotic-Biochemistry of nitrogen fixation-Assimilation of nitrate and ammonium ions-Biosynthesis of amino acids-Reductive amination and Transamination- GS/GOGAT Pathway-Control of amino acid synthesis.
Biosynthesis of saturated fatty acids in plants-glyoxylate cycle

Module-4 - Release of Energy**12hrs**

Respiration- Stage 1-Glycolysis and formation of pyruvic acid-**Stage 2-**oxidation of pyruvate-Formation of Acetyl CoA- **Stage 3-** The Citric acid Cycle- Pathways of Discovery-Hans Krebs and the citric Acid cycle-Energetics of Glycolysis,The Citric Cycle and the Electron transport system- Regulation of citric acid cycle- amphibolic nature of citric cycle-The pentose phosphate pathway-Glyoxylate pathway-A Short circuit of the Krebs cycle. **Stage 4-** The electron transport System and oxidative phosphorylation in mitochondrion. Electron carriers function as multi enzyme complexes-ATP synthesis-Chemi osmotic theory-pathways of Discovery:Peter Mitchell and the chemiosmotic theory – summarizing the yield of Aerobic Respiration.

Catabolism of proteins and fats can yield considerable energy

Cellular respiration of fats-Oxidation of fatty acids- activation of fatty acids-Transport across the mitochondrial membrane- β oxidation of saturated fatty acids.

Cellular respiration of proteins- Oxidative degradation of Amino acid- The Flow Sheet of aminoacid Oxidation- Pathways leading to acetyl CoA and entry into TCA cycle

Secondary Metabolism- Link Between primary and secondary metabolism

Cells can metabolize food without oxygen –fermentation-ethanol- lactic acid.

The stages of cellular respiration evolved over time; The evolution of metabolism-degaradation→glycolysis→anaerobic photosynthesis→oxygen-forming photosynthesis→ Nitrogen fixation→aerobic respiration.

PRACTICALS**(18Hrs)**

1. Extraction of invertase (from any source)
2. assay of invertase
3. pH dependent activity profile of enzymes
4. Calorimetric estimation of reducing sugars in germinating seeds
5. Demonstration of Hill reaction
6. Separation of leaf pigments by paper chromatography/Column chromatography/ TLC
7. Effect of light intensity on photosynthesis by Wilmot's bubbler
8. Kuhnes fermentation experiment
9. Respirometer experiment
10. Experiment to show anaerobic respiration

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Name :

KANNUR UNIVERSITY EXAMINATION**Botany-Theory Model Question Paper****5B05BOT/PLS- ENERGY AND INTERMEDIARY METABOLISM****Time: 3 Hours****Weightage: 30****Section A**

(Objective questions (Multiple choice /one word/sentence/ fill in the blanks /Match the following, true or false etc.) in cluster of four. Each cluster carries a weightage of 1

1. Choose the Correct Answer

- i) The conversion of pyruvate to oxalo acetate is likely to require which of the following co-enzymes?
 - (a) Biotin (b) Vit B12 (c) Thiamine pyrophosphate (d) Pyridoxal phosphate
- ii) Redox potential value (E_0) of NAD/NADH system is
 - a) -0.1V (b) +0.1V (c) -0.32V (d) +0.32V
- iii) Which of the following is not a component of mitochondrial electron transport?
 - (a) Ubiquinone (b) Cytochrome b_6 (c) Cytochrome c (d) cytochrome a_3
- iv) In photosynthesis, dark reaction or black mans reaction is
 - a) Enzymatic and occur in absence of light
 - b) Non Enzymatic and occur in the absence of light
 - c) Enzymatic and independent of light
 - d) Enzymatic and occur in the presence of light

2

- i) The oxidation of a molecule of palmitic acid, $\text{CH}_3(\text{CH}_2)_{14}\text{CO}_2\text{H}$:
 - (a) yields 8 molecules of acetyl-CoA and some ATP and water
 - (b) yields 16 molecules of acetyl-CoA only
 - (c) yields carbon dioxide and water only
 - (d) uses more ATP than it generates
- ii) The K_m Value of an enzyme (Michaelis constant) for a substrate is defined as
 - (a) Half the substrate concentration of which the reaction rate is maximal
 - (b) The substrate concentration of which the reaction rate is halfmaximal
 - (c) The dissociation constant of the enzyme –product complex
 - (d) The dissociation constant of the enzyme –substrate complex
- iii) Co enzymes are --- organic compounds
 - a) non protein b) protein c) lipoprotein d) all of the above
- iv) The emission of phosphorescent radiation is slow due to
 - (a) Singlet ground state to triplet excited state transition is forbidden
 - (b) Triplet excited state to singlet ground state transition is forbidden
 - (c) Singlet excited state to triplet excited state transition is forbidden
 - (d) Both (b) and (c)

3. State true or false

- i) The synthesis of glucose from lactate or glycerol is called glycolysis
- ii) Phaeophytin is a chlorophyll in which central Mg atom is replaced by hydrogen
- iii) Assimilation of nitrogen by plants is exclusively by ammonia.
- iv) Light reaction takes place during day time and dark reaction in night

4 Fill in the blanks

- i) Photorespiration is otherwise called as C₂ cycle because-----
- ii) RUBISCO is-----
- iii) Initial acceptor of carbon dioxide in CAM cycle is-----
- iv) The glycosidic bond involved in the branch point of amylopectin is-

5. The following are Nobel prize winners in photosynthetic research. Rearrange column B and C to match column A.

i)	Total synthesis of chlorophyll	Melvin Calvin	1978
ii)	Elucidation of enzymatic mechanism underlying the synthesis of adenosine triphosphate (ATP).	Paul D. Boyer and John E. Walker	1965
iii)	Oxidative and photosynthetic phosphorylation: chemi-osmotic theory	Robert Burns Woodward	1997
iv)	Carbon-dioxide assimilation in photosynthesis	Peter Mitchell.	1961

Section B**Answer any four questions. (Each question carries a weightage of 1)**

6. Can ATP synthesis take place in thylakoid membranes kept in the dark? Explain your answer.
7. The net equation for oxidative phosphorylation can be written as

$$2\text{NADH} + 2\text{H}^+ + \text{O}_2 \rightarrow 2\text{H}_2\text{O} + 2\text{NAD}$$
 Write an analogous equation for the light reactions of photosynthesis
8. Sachs found that the leaves lose more weight during night when they are attached to the plant than they are excised. Explain why?
9. The term "dark reactions" was used for many years to describe the reactions for incorporating CO₂ in photosynthesis. Do you think that the term is inappropriate now?
10. Rate of photosynthesis is higher in intermittent light than in continuous light. Evaluate.
11. Cite two instances of the application of radioactive isotopes in the study of metabolic process in plants.

Section C**(Short answer questions. Answer any five; each question carries a weightage of 1)**

12. What are terpenes chemically, and how are they synthesized? Give one example each of mono- and triterpenes that serve as feeding deterrents to insects.
13. Traced out the pathway by which Calvin explored the path of carbon in photosynthesis
14. Comment on the amphibolic nature of citric acid cycle.
15. Differentiate competitive and non competitive inhibitors
16. Write on the role of ATP in biological reactions.
17. What is GS/GOGAT pathway?
18. Write a note on the regulation of citric acid cycle

Section D**Short answer questions. Answer any six; each question carries a weightage of 2.**

19. Compare and contrast photophosphorylation and oxidative phosphorylation
20. What is β oxidation? Elucidate β oxidation of fatty acid.
21. What is an action spectrum? What is the relationship between the action spectrum for photosynthesis and the absorption spectrum of chlorophyll?
22. Discuss the main functions of secondary metabolites in plants and relate these functions to the sites of accumulation of secondary compounds in the plant
23. Summarise chemi osmotic coupling theory.
24. What is phosphorescence? Trace the Photochemistry and transfer of excitation energy in photosynthesis.
25. Explain the biochemistry of nitrogen fixation.
26. Give an account of the carbon dioxide fixation in succulent species.

Section E**(Essay type question. Answer any one; each question carries a weightage of 4)**

27. Explain the process of root nodule formation in leguminous plants infected by rhizobium. Give a detail account of the biochemistry of nitrogen fixation.
28. Describe the different steps whereby a molecule of glucose is oxidized to CO_2 in glycolysis and the citric acid cycle. In what steps is CO_2 released, and in what steps is energy conserved?
29. Give a detailed account of enzyme classification

	Multiple choice (2) Weigh tage 1 for four questions	Fill in the blanks weigh tage 1 for four questions 1	True/ false1 weig htage 1 for four quest ions	Match the follow ing1 weigh Tage 1 for four questions	Short answer weigh tage 1	Short answer weigh tage1	Short essay weigh tage2	Essay weigh tage 4
knowledge	3	4	2	4	2	4	4	1
Compre-hension	2		2		2	2	1	1
application							2	
analysis	3				1	1		1
synthesis								
evaluation					1		1	

B.Sc. Botany/Plant Science**Core-6****GENETICS AND MOLECULAR BIOLOGY****Course Code: 5B06 BOT/PLS****No. of credits- 4****No. of contact hours- 72+36****Aims and objectives**

1. Enable students to understand the current trends in genetics.
2. Make student aware of the historical process through which modern genetics evolved.
3. To orient them in such a way that they will be able to apply the knowledge of classical and molecular genetics in agriculture, medicine, research and industry
4. To create interest and develop appreciation in the tremendous growth of genetics and how it is suitable for defining and understanding nature .
5. Gives an insight into the science of heredity.
6. Helps to understand the basic concepts of Molecular and classical genetics.
7. Lead the students into specialized programmes, in higher studies, in the field of biotechnology and molecular biology.

Course Outline**Module-1****(5Hrs)**

Introduction to the science of Genetics -The science of genetics-classical and modern approaches:-Genetics has an interesting and rich history-Pre historic times-The greek influence-Before1860; 1860-1900; 1900-1944; 1944-present - A brief overview of classical, molecular and evolutionary genetics.- Basic concept of genetics-scope of genetics-genes and organism-gene transmission-Genetics has a profound influence on society- Eugenics and Euphenics-genes and environment.

Meiosis and sexual Reproduction

General Description of Meiosis-unique features-The first meiotic division-The second Meiotic Division- Genetic consequences of meiosis and types of meiosis-Meiosis in plants - The development of gametes varies during spermatogenesis and oogenesis –cell biology of fertilization.—significance of meiosis.

Module2- Mendel solved the mystery of heredity**(9hrs)**

Mendel's experiments-law of segregation and independent assortment of characters. Genes and Homologous chromosomes-Independent assortment and genetic variation- **Pathway of discovery**-Mendel's lecture to the natural history society of Brunn on the findings in1865 - unrecognized -. Excerpts from Mendel's original paper-.The Re Discovery and Re interpretation of Mendel's working 1900- Statistical Probability and Mendelian genetics-Hypothesis testing-Chi-square analysis (goodness of fit test)- Human genetics follows Mendelian principles.-pedigree analysis- Symbols of Pedigree, Pedigrees of Sex-linked & Autosomal (dominant & recessive)

Mendelian Genetics and sexual cycle in plants. (Alternation of generations-Haploid-Diploid).

Module 3- Gene interactions**(9hrs)**

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 -Linkage, crossing over and chromosome mapping**(5hrs)**

Linkage -crossing over-Mechanism of crossing over-cytological demonstration of -

Linkage Vs Independent assortment - complete and incomplete linkage- crossing over-(Maize and Drosophila)-Chromosome Mapping-Two point and three point test cross-Determining the gene sequence-Interference and coincidence- **Path way of discovery**-The First Chromosome Map by Alfred H. Sturtevant

Module 5**(6hrs)****Sex Determination and sex linked inheritance**

Determination of sex-sexchromosomes-Chromosome theory of Sex determination-Heterogametic males and Females. Dosage compensation -Lyon Hypothesis-Sex determination in plants-Genic balance theory.

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 -**Organelle Heredity-Chloroplast**; Variegation in Four o' clock plant-**Mitochondria**: Poky in neurospora.

Module-6 Molecular Biology**(11Hrs)**

A brief overview of molecular biology.; The encounter between biochemistry and genetics-

Pathway of Discovery:Origin of cells from Concentrated solution of organic compounds-J.B.S.Haldane and A.I.Oparin- Experiment by Stanley Miller- Genes are DNA. In search of the genetic material- historical perspective-Evidence for DNA as genetic material, direct and indirect evidences (Griffith, Avery, McLeod, Mc Carthy, - transformation studies - Hershey-chase experiments transfection experiment)-Chargaff's rules-The double helix- Watson and Crick model of DNA -**Pathway of discovery**- Rosalind Franklin and discovery of DNA - Alternate Forms of DNA-A,B and Z form of DNA- DNA replication-Meselson and Stahl Experiment -Enzymology of DNA replication - Replication apparatus.-Mechanism of Replication -continuous and discontinuous -Bidirectional replication- DNA Synthesis invitro-**Pathway of discovery**-Arthur Kornberg and DNA polymerase-1 -RNA-Structure and composition of tRNA (clover leaf model) mRNA and rRNA.

Concept of gene - History of the DNA world is written in gene sequences-Gene and Cistron-Evolution of the gene concept.-**Pathway of Discovery** (1) Beadle and Tatum's experiments with Neurospora- (2)Archibald Garrod -Inborn errors in metabolism-Units of gene-cistron, recon and muton- One cistron-one polypeptide concept.

Pathway of discovery-One gene –one enzyme hypothesis by Beadle and Tatum

Module-7 Gene Expression (9Hrs)

Transcription- DNA dependent synthesis of RNA. RNA polymerases-. initiation, elongation and termination of RNA synthesis-.RNA processing in prokaryotes and Eukaryotes- Transcription and RNA processing. The interrupted Gene.Introns –Exons-Exon Shuffling- RNA Editing -**Pathway of Discovery**-Richard Roberts and Philip Sharp and the discovery of introns- Exons corresponds to the functional domain of proteins.-Introns can be precisely deleted from DNA. .How did interrupted genes evolve?- overlapping Genes- **Genetic code**- Universality, Triplet binding and reading Frame-anticodons ,degeneracy and wobble in the code -Codon- tRNA interaction- **Pathway of Discovery**-Nirenberg and leder experiment- Nirenberg and Matthaei experiment- **Translation**-Protein synthesis-Activation of aminoacids – initiation, elongation, termination and release - special signals of termination.- protein folding and post translational processing

Module-8- Gene Regulation (9Hrs)

Molecular organization of promoters in prokaryotes and Eukaryotes- **Gene regulation in prokaryotes** - Operon concept(lac,his,trp ara operon)- Genetic control of lysogeny and lytic cycle in phage lamda bacteriophages - **Genetic regulation in Eukaryotes** - different from prokaryotes-various levels of regulation-Transcriptionally active and inactive form of chromatin-Modification and accessibility of DNA-Role of promoters in Eukaryotic gene regulation.

Module -9- (9hrs)

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 -Cellular oncogenes-Tumour suppressor genes

Gene Mutation- General –Types of mutation- . Detection of mutation- .Molecular basis of mutation- Transition, Transversion and Frameshift mutation-tautomeric shift- alkylating agents-Base analogues- DNA Repairing Mechanism- mutagenic agent

Practicals 36 hrs

Meiosis- To make smear preparations of the flower buds of any one of the following Plants- Rhoeo, Tradescantia, Capsicum, Coix

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

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Code:

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Name :

KANNUR UNIVERSITY EXAMINATION
Theory Model Question Paper

Course Code: 5B06 BOT/PLS**GENETICS AND MOLECULAR BIOLOGY****Time: 3 Hours****Total Weightage: 30***Draw diagrams wherever necessary***Section - A****Answer All****(Questions in bunches of four; Each bunch carries a weightage of 1)**

1. Choose the correct Answer

i) Which of the following statements defines a gene most precisely?

- a) A gene is a fragment of DNA that codes for the production of a phenotypic trait
- b) A gene is a fragment of DNA that codes for the production of a polypeptide or polynucleotide.
- c) A gene is a fragment of DNA that codes for the production of a protein.
- d) A gene is a fragment of DNA that comprises a unit of inheritance

ii) 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

iii) The first event in the translation is the binding of the mRNA leader to the

- a) Smaller ribosomal subunit
- b) Larger ribosomal subunit
- c) Polysomal core
- d) tRNA

iv) Which is the correct sequence according to the increasing molecular weight?

- a) tRNA → DNA → rRNA
- b) rRNA → DNA → tRNA
- c) DNA → rRNA → tRNA
- d) tRNA → rRNA → DNA

2 i) What would be the frequency of AABB individuals from a mating of two AaBb individuals?

- (a) 1/64 (b) 1/32 (c.) 1/16 (d.) 1/8

ii) Which of the following is not an event that occurs during the first division of meiosis:

- a) replication of DNA,
- b) pairing of homologous chromosomes,
- c) formation of haploid chromosome complements,
- d) crossing over, or separation of sister chromatids

iii) 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

- iv) In a collection of gametes from a heterozygote(AaBb), 10 out of 50 are recombinant for the a and b genes. How far apart are genes a and b?
 a)80m μ b)20m μ c)10m μ d)cannot be detected

3. State true or false

- i) Semi conservative mode of replication of DNA was proved by Watson and Crick
 ii) RNA polymerase and DNA polymerase are required for DNA replication
 iii) Sister chromatids separate and segregate to opposite poles during Meiosis-1
 iv) Maize has 10 pairs of chromosomes. Linkage group present in it are 20

4. Answer in one word or in one sentence

- i) An intercalating dye used to detect nucleic acid when viewed under uv light is-----
 ii) The term to define gene as a unit of genetic function, a region of DNA which encode a specific product is known as-----
 iii) What molecule bears the anticodon?
 iv) Y-linked genes are otherwise called -----

5. Rearrange column B and C to match column A

i)	Co-linearity of genes and enzymes	Barbara Mclintock	1877
		George Beadle	
ii)	Genes	T.H.Morgan	1911
		Gregor Mendel	
iii)	Linkage	Yanofsky	1937
		H.G.Khorana	
iv)	Crossing over	Johannsen	1967
		Griffith	

Section B

. Distinguish between any four of the following: (Each carries a weightage of 1)

- 6) a) hn RNA and mRNA
 b) monocistronic mRNA-polycistronic mRNA
 7) Wobble hypothesis and Degeneracy of the genetic code
 8) Transposons and retrotransposons
 9) a) promoter-termination codon
 b) missense mutant-nonsense mutant
 10) photo reactivation-excision repair
 11) Replication and Transcription

Section C**(Short answer questions. Answer any seven; each question carries a weightage of 1)**

- 12) UV light causes thiamine dimerisation. Describe the mechanism, in order of efficiency that can repair the damage. Name the enzymes involved?
- 13) Determine the sequence of both strands of DNA from which the RNA shown below was transcribed. Indicate the 5' and 3' ends of the DNA with an arrow and show which strand was transcribed?

5' CCAUCAUGACAGACCCUUGCUAACGCA3'

14) A double stranded DNA molecule is 30% adenosine (A)

a) what is the complete base composition of this molecule?

b) Answer the same question, but assume the molecule is double stranded RNA

15) In the ABO blood system in human beings, alleles I^A and I^B are co dominant and both are dominant to the I allele. In a paternity dispute, a type AB woman claimed that one of four men, each with different blood types, was the father of her type A child. Which of the following could be the blood type of the father of the child on the basis of the evidence given?

- a) Type A
- b) Type AB
- c) Type O
- d) Type B

16) Explain why linkage is a violation of Mendel's law of independent assortment of genes

17) List all enzymes that participate in the transcription and translation process

18) Draw the tautomeric form of adenine and cytosine

19) List the ways in which the behaviour of chromosomes during meiosis correlates with the behaviour of genes during gamete formation

20) Assume Mendel made the cross of two true breeding plants that differed in all dominant traits, the other with all recessive traits. What would the ratio of phenotype be in the F₂ generation?

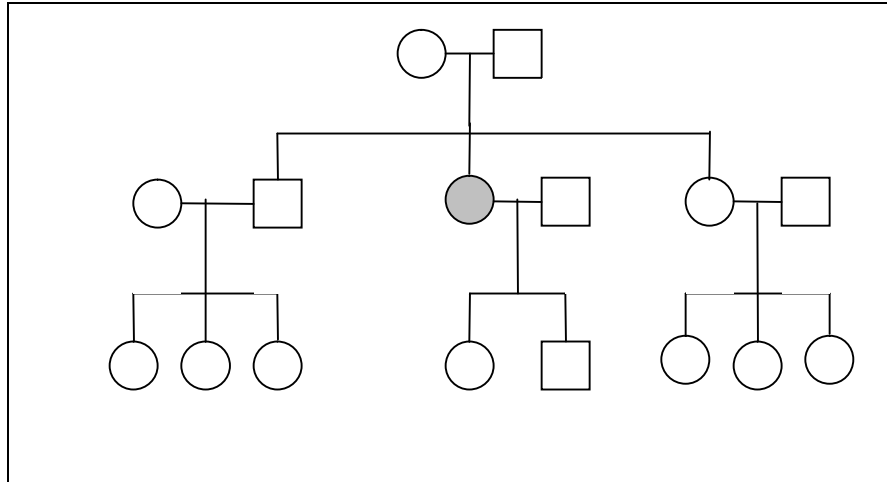
You are given an angiosperm, moss and a pteridophyte. Which among them will you choose as your experimental organism for studying mutation genetics. Why?

Section D**Short answer questions. Answer any five; each question carries a weightage of 2.**

21). In the following pedigree chart what is the probability of the following persons are of genotype Aa?

- 1 111-6
- 2 111-4

3 111-8



22) Can two mulattoes have white skinned offspring? Can two white skinned people have dark skinned offspring? Explain.

(23) In *Drosophila*, crosses of Dichaete winged flies \times Dichaete always give two thirds Dichaete to one third normal winged offspring. Dichaete \times normal gives one half Dichaete and one half normal. How would you explain these results?

24) Assume that the difference between a type of wheat yielding about 4gm plant and one yielding 10 is due to three equal and cumulative multiple factor pairs, AABBCc, cross one type with the other. What will be the phenotype of the F₁; of the F₂?

25) Diagram the relationships of the three types of RNA at a ribosome. Which relationships make use of complementarity?

26). In the following problems on blood groups determine the genotypes of the parents?

- One parent is group A and the other group B, but all four groups are represented among children.
- Both parents are group A, but three fourths of the children belong to group A and one fourth to group B
- One parent is AB and the other B, but of the children one fourth A, one fourth AB and one half B

27) Contrast the need for the enzymes involved in the metabolism of lactose and tryptophan in bacteria in the presence and absence of lactose and tryptophan respectively.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

28) Summarise the central dogma of molecular biology and explain how mutation in DNA can alter a protein.

B.Sc. Botany/Plant Science**Core-7****EVOLUTION, PALEONTOLOGY AND PLANT BREEDING****Course Code: 5B07 BOT/PLS****No. of credits- 3****No. of contact hours- (54+18)****Aim and Objectives**

- 1) To understand nature and the evolution of life
- 2) To enable them to investigate the evolutionary phenomena with out prejudices rather than reaching into hasty conclusions.
- 3) To enable them to correlate the origin and evolution of life and how genetic studies contributed in understanding evolution.
- 4) To understand the chronological events those have taken place in the history of earth with the help of fossil studies.
- 5) To appreciate how the knowledge of evolution helped plant conservation and improvement.

Module 1**5hrs****Introduction**

Why study evolution? Interfering the history of life. Origin of life-organismal evolution. Theories about the origin of life. Origin of Eukaryotes – Mitochondria and endosymbiotic theory.-Origin of Plants – Chloroplast and endosymbiotic theory

History of Development of Evolutionary Principles -Lamarck, Weisman and De Vries, Darwin- Wallace- Neo-Darwinism- Modern concepts of evolution.

Module 2 - The Mechanisms of Evolution.

11hrs

Genetic changes leads to evolution and the origin of bio diversity

Mutation and Evolution- Polygenic inheritance –heritability and selection- Polyploidy and Evolution, Hybridization and Evolution

Population Genetics:Process that change allelic frequencies- 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.

Natural selection and Evidences of evolution

Natural selection can produce evolutionary change- Darwins finches,industrial melanism, artificial selection. Fitness-effects of selection –adaptation- Micro and macroevolution Evidences from other fields of biology -radiometric dating- the fossil record-gaps in the fossil record-Gradual vs. abrupt change- mass extinction .

Module 3**6hrs****Origin of species**

Species are the basic unit of evolution- species maintain their genetic distinctiveness through barriers to reproduction.-Clustures of species reflect rapid evolution.

Evolution and speciation -Mechanism of cladogenesis- Reproductive isolation.

Allopatric,parapatric and Sympatric speciation- Genetic variation- genetic polymorphism

Module 4**5hrs****Evolution of genomes**

Evolutionary history is written in genomes- comparative genomics-Origin of genomic differences-same gene, new function-different genes, convergent function-functional genomics

Module 5**11hrs****Diversity of life on earth.**

.Systematics and the phylogenetic revolution-Biologist name organism in a systematic way.- classification.Reconstructing and Using Phylogenies-evolutionary relationship.

All living organisms are grouped into categories- Molecular phylogenetics: Phylogeny – Construction of Phylogenetic trees based on biomolecules – Evolutionary classification based on amino acid sequences, Quantitative DNA measurements, Repetitive DNA sequences, restriction enzyme sites and nucleotide sequences.

Evolution and plant diversification –an overview -Early plant life –the algae.-origin and evolution of land vascular plants- Angiosperms - the culmination of plant evolution.-The main line of plant evolution. Evolution –Retrospect and prospect.

Module 6- Palaeontology**9 hrs**

Objectives of palaeobotany- Fossil formation-Theories- Types of fossils. impressions, compressions, casts, molds and petrifications and radio carbon dating. Techniques for studying fossils- Geological time scale- Evolutionary trends- Fossil bryophytes- pteridophytes , Gymnosperms and Angiosperms- Applied aspects of Palaeobotany- Palaeopalynology, Exploration of fossils fuels, Radiocarbon dating,-Brief study of the following fossils- Lepidodendron, Lepidocarpon, Lyginopteris.

Module 7- plant breeding**9 hours**

Plant breeding- History; Genetic resources- centres of diversity and origin of crop plants

Introduction and Objectives of Plant Breeding ; Domestication, Plant Introduction and Acclimatization- Methods of Breeding; Selection, (Mass, Pureline and Clonal), Hybridization, Heterosis, Polyploidy breeding and Mutation breeding – Achievements

Practical-**18hrs**

- 1.Fossil pteridophytes- Rhynia Stem, Lepidodendron, Lepidocarpon.
2. Fossil Gymnosperm- Lyginopteris

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2. www.bbc.co.uk/education/darwin/index.shtml
3. [www. nhm.ac.uk](http://www.nhm.ac.uk)
4. [www. biologybrowser.org](http://www.biologybrowser.org)
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KANNUR UNIVERSITY EXAMINATION**Botany- Model Question Paper****CORE – 7****5B07 BOT/PLS- EVOLUTION, PALEONTOLOGY AND PLANT BREEDING****Time: 3 Hours****Total Weightage:30****Section - A**

(Objective questions (Multiple choice /one word/sentence/ fill in the blanks /Match the following, true or false etc.) in cluster of four. Each cluster carries a weightage of 1

1. Choose the correct answer.

- i) Which of the following is not a source of variation in a population?
- Inherited genetic differences.
 - Differences due to age.
 - Differences due to accident.
 - None of the above
- ii) Why, according to our reading, did Darwin take so long to publish the Origin of Species?
- Darwin wanted to share his theory as quickly as possible once he returned from his voyage on the Beagle.
 - It took twenty years for Darwin to develop a theory.
 - Darwin suffered from a number of illnesses.
 - Darwin was concerned about the reaction of others to the implications of his theory.
- iii) What's the difference between genetic drift and change due to natural selection?
- Genetic drift does not require the presence of variation.
 - Genetic drift does not involve competition between members of a species.
 - Genetic drift never occurs in nature, natural selection does.
 - There is no difference
- iv) Differential reproduction rates of various genotypes is known as
- selection
 - inbreeding
 - Pureline
 - introduction
- 2 i) The following genotypes are found in a population:
 BB Bb bb
 70 50 20
 What are the allele frequencies of B and b?
- B = 0.86 and b = 0.14
 - B = 0.68 and b = 0.32
 - B = 0.63 and b = 0.36
 - B = 0.32 and b = 0.68
- ii) Which concept was not included in Charles Darwin's theory of natural selection?

1. survival of the fittest
 2. struggle for existence
 3. overproduction of offspring
 4. punctuated equilibrium
- iii) Which of the following gases was not prevalent in abundance in the atmosphere of early earth, but became more prevalent after living organisms (mostly phototrophs) evolved? _
- a. oxygen
 - b. nitrogen
 - c. methane
 - d. ammonia
- iv) Working from deep geologic strata toward shallow geologic strata, what is the sequence in which fossils of these groups should make their first appearance?
1. charophyceans
 2. single-celled green algae
 3. bryophytes
 4. plants with a dominant sporophyte
- a) 3, 1, 2, 4
 - b) 2, 4, 1, 3
 - c) 2, 1, 3, 4
 - d) 1, 3, 2, 4

3. State true or false.

- i) The theory that evolutionary change is slow and continuous is known as punctuated equilibrium
- ii) . large population size, random mating, no selection, no migration, no mutation are the assumptions of Hardy Weinberg equilibrium.
- iii) Variation within a pureline is heritable.
- iv) Angiosperms are formed during cretaceous period.

4. Fill in the blanks

- i) ----- is considered as the father of paleobotany
- ii) The theory of chemical origin of life proposed by
- iii) Fossils of leaves are known as
- iv) Polyploidy brings about Speciation.

5. Rearrange column B and C to match A

A	B	C
cenozoic	moss	4500×10^6
mesozoic	algae	370×10^6
palaeozoic	conifers	190×10^6
pre-cambrian	Angiosperms	11×10^6

Section -B

Answer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Progressive and Retrogressive evolution
7. Broad and narrow heritability
8. Micro and macro evolution
9. Isogenic lines and Purelines

10. Darwinism and Neo Darwinism
11. polyploidy breeding and mutation breeding

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. What is the evidence that life has evolved?
13. What are the major mass extinctions, and what are their presumed causes? What is the evidence that extinctions have created opportunities for the survivors?
14. In what ways do phyletic gradualism and punctuated equilibrium differ? Is there evidence for either or both of these models of morphological evolution? What could cause a pattern consistent with punctuated equilibrium?
15. How is radiometric dating performed to determine the age of rocks? How can this method be used to estimate the age of fossils?
16. Briefly describe the bulk method of breeding and its application.
17. Give a brief account on functional genomics
18. A.I. Oparin is credited with formulating the modern concept on the origin of life. His theory has subsequently been substantiated by scientists Stanley Miller and Sidney Fox. What are the main points in Oparin's theory?
19. How did practitioners of evolutionary systematics decide on the appropriate groupings of organisms? What are the limits of this approach?

Section D

Answer any *Six*

(Short-essay questions; Each question carries a weightage of 2)

20. What is genetic drift? What is its cause, and how does it affect populations? What are the consequences of genetic drift? What conditions increase the strength of genetic drift? How is an allele's frequency related to the probability of fixation of that allele?
21. Discuss the role of Allopolyploidy in Plant breeding.
22. What were the major evolutionary events of the Precambrian, Cambrian, Ordovician to Devonian, Carboniferous and Permian, Mesozoic, and Cenozoic. When did the Paleozoic begin and end (and with what periods?), when did the Mesozoic end (and with what period?). What was significant about the end of the Paleozoic and Mesozoic?
23. What are the various forms of nonrandom mating? What are their effects on genetic variation in populations? How do positive assortative mating and inbreeding differ? What are the negative consequences of inbreeding?
24. In what ways can speciation occur in the absence of geographic isolation? Why is speciation via hybridization so fast?
25. Differentiate lepidodendron and lepidocarpon
26. What kinds of observations during the voyage of the Beagle led Darwin to the theory of evolution via natural selection
27. Discuss the scope of hybrid varieties in self pollinated crops.
28. How did changes in geological and biological views set the stage for Darwin's ideas about evolution?

B.Sc. Botany/Plant Science**CORE -8****DIVERSITY OF LIFE-1: MICROBIOLOGY, MYCOLOGY, PHYCOLOGY,
LICHENOLOGY AND PLANT DISEASES****Course Code: 5B08 BOT /PLS****No. of credits- 3****No. of contact hours- 54+36****Aim of the Course**

To get an idea of diversity existing among lower forms of Plants.

Objectives:

1. To have a general understanding about the diverse groups of organisms.
2. To enable the student to identify the different organisms by morphological and anatomical studies.
3. To get a comparative account of plants- in its life cycle, morphology, anatomy and reproduction with an evolutionary link
4. To appreciate the fantastic commonness exists among organisms. .
5. The student will be able to appreciate the uniqueness of different groups and the way they are classified.
6. To understand the symptomology and prevention of plant diseases

Course Outline**(Questions for theory examination will cover the Types mentioned for practicals also.)****Module I- Introduction-****(2hrs)**

Origin and evolution of biodiversity Major categories of living organisms-kingdoms of life- six kingdoms of life by Carl Woese- 3domains of living organisms-archaea, bacteria, eukarya- characteristics and evolutionary relationship among the three domains- four kingdoms of eukaryotes--key characteristics of prokaryotes and eukaryotes- outline of evolution- bacteria→blue green algae→algae; aquatic habitat → land

Module 2- Microbiology**(16 hrs + 5hrs)**

Introduction to microbiology – Aims , objectives, concept, scope and significance- Koch's postulates. Bacterial classification (Brief account of Bergey's system), Major characteristics, Ultra structure of cell, reproduction, Genetic recombination in Bacteria – Brief account only .General characters of Actinomycetes, Mycoplasma, Rickettsiae, Archaeobacteria and Cyanobacteria -Economic importance of bacteria with special reference to industry, medicine, Agriculture and environment - Harmful microbes: Virus - classification, Nomenclature, RNA and DNA Viruses – structure, properties and reproduction of TMV, Bacteriophages and HIV. - Economic importance.-Agricultural Microbiology-Role of microbes in soil fertility, symbiotic microbes and crop production, microorganisms as biofertilizers, mycorrhiza and biopesticides –Brief account only: Food microbiology- Food spoilage and food preservation.: Aquatic microbiology –Source of water, water contamination, standard of water - testing. suitability of water, importance of aquatic microbes, methods of water purification, microbiology of sewage or waste water, methods of waste water treatment..

Practicals**(5 hrs)**

- 1) Micropreparation and identification of Nostoc.
- 2) Isolation and purification of Bacteria - Streak plate method.(Demonstration only)
- 3) Gram staining.
- 4) Isolation of Rhizobium from root nodules of leguminous Plants.
- 5) Study of motility by hanging drop method.
- 6) Identify TMV, HIV and Bacteriophages from the photographs.

Module 3- Mycology-**(10 hrs + 12 hrs)**

Fungi-general characters and classification (Alexopaulose *et al.* (1996)-habit and habitats-mechanism of nutrition- heterothallism and life cycle- cell structure, specialized mycelial structures, reproduction (brief account)-Economic importance- general characters and life cycle of the following groups: Mastigomycota, Zygomycota, Ascomycota, Basidiomycota, Mitosporic fungi (Asexual fungi or fungi imperfecti)- Mycotoxins and Secondary metabolites in fungi.

Practical**(12 hrs)**

- 1) Make micro preparations of vegetative and reproductive structures of the following types:
Pythium, Rhizopus, Saccharomyces, Aspergillus, Peziza, Puccinia, Agaricus, Cercospora
- 2) Make labelled sketches of the specimens observed.

Module 4- Phycology**(15 hrs + 15hrs)**

Algae- introduction - thallus organization – habitats- ultra structure of cell- pigmentation evolutionary trends - classification by Fritsch-origin and evolution - symbiotic theory, variation in chloroplast structure -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, Xanthophyceae, Bacillariophyceae, Phaeophyceae and Rhodophyceae.

Practical**(15hrs)**

- 1) Make Micro preparation of vegetative and reproductive structures of the following types- Chlorophyceae - Chlorella, Volvox, Ulothrix, Cladophora, Zygnema, Oedogonium and Chara. Xanthophyceae – Vaucheria; Bacillariophyceae – Pinnularia; Phaeophyceae- Sargassum; Rhodophyceae- Polysiphonia
- 2) Make labelled sketches of Specimens observed.

Module 5- Lichenology**(3 hrs + 1 hrs)**

Lichens - nature of association-classification-habit and habitat- thallus morphology – internal structure –reproduction-economic importance.

Practical**(2 hrs)**

- 1) Make micropreparation of vegetative and reproductive parts of Usnea. Make sketches of the specimens observed

Module 6- Plant Diseases**(8hrs +3 hrs)**

Introduction- History of Plant pathology – Classification of plant diseases on the basis of causative organisms and symptoms- Host-Parasite interactions- Transmission and dissemination of diseases-Control of Plant diseases – Quarantine and Seed certification – remedial and biological control – breeding for disease resistance- Study of the following diseases with emphasis on symptoms, disease cycle and control measures - Leaf mosaic of

Tapioca, Citrus canker, Quick wilt of pepper, Soft rot of Ginger, Blast disease of Paddy, Abnormal leaf fall of Rubber- Brief account of the following fungicides –Bordeaux mixture, Bordeaux paste, Tobacco decoction, Neem cake and oil.

Practical

3 hours.

1. Identify the diseases mentioned in the syllabus with respect to causal organism and symptoms.
2. Students should be trained to prepare the fungicide Bordeaux mixture and Tobacco decoction.

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Code:

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KANNUR UNIVERSITY EXAMINATION**Theory -Plant Science/Botany Model Question Paper****Core course-8****5B08BOT/PLS- DIVERSITY OF LIFE-1- MICROBIOLOGY, MYCOLOGY, PHYCOLOGY, LICHENOLOGY AND PLANT DISEASES****Time: 3 Hours****Total Weightage: 30****Section - A****Answer All****(Questions in bunches of four; Each bunch carries a weightage of 1)**

1. Choose the correct answer

- i) Floridean starch is the food product found in
 - a) Chlorophyceae b) Phaeophyceae c) Rhodophyceae
 - d) Xanthophyceae
- ii) *Rhizopus* multiplies by the production of
 - a) Zoospores b) conidiospores c) sporangiospores
 - d) chlamydospores
- iii) Many gram-ve bacteria are covered with fine hair-like appendages called
 - a) Sex pili b) fimbriae c) flagella d) axial fibrils
- iv) Usnea lichen is
 - a) Fruticose b) Foliose c) Crustose d) None

2. State true or false

- i) Plaque stage of *Volvox* is a tetrad
- ii) *Sargassum* plant is a sporophyte
- iii) The dikaryotic mycelium of *Puccinia graminis* is seen in Wheat leaf.
- iv) The three phases in sexual reproduction of fungi are plasmogamy, karyogamy and meiosis.

3. Fill in the blanks

- i) citrus canker is caused by _____
- ii) Agar agar is obtained from _____
- iii) The synzoospores are found in _____
- iv) Algal partner of the lichen is known as _____

4. Match the following.

	A	B
i)	Phyco erythrin	coenocytic
ii)	Fucoxanthin	Soap dish type
iii)	Frustule	Laminarin
iv)	Absence of pigment	Floridean starch

5. Answer in one word or in one sentence

- i) Name a free- swimming colonial alga
- ii) Fruit body of lichen
- iii) Who developed the staining technique for bacteria?
- iv) Name the association between fungal hyphae and roots of higher plants.

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. Monera and Protista
7. Sexual reproduction in Zygomycota and Ascomycota.
8. Eukaryotes and Prokaryotes.
9. Algae and Blue-Green algae.
10. Aquatic microbiology and agricultural microbiology.
11. Wilt and Rot

Section CAnswer any *Five***(Short answer questions; each question carries a weightage of 1)**

12. Comment on the function of air bladder in *Sargassum*.
13. Economic Importance of Fungi?
14. Enumerate the symptoms of Quick Wilt of Pepper
15. General characteristics of bacteria.
16. Give an account of Bergey's system of bacterial classification.
17. List down your comments about the physiological relationships between the Algal and Fungal partners of Lichen.
18. Analyse the following statements and write any two statements applicable to appropriate columns given below.

Related to Algae	Related to Fungi

- i) Non chlorophyllated thalloid and heterotrophic.
- ii) Notorious for food spoilage.
- iii) Autotrophic and chlorophyllated.
- iv) Parasitic or saprophytic in habit.
- v) Classified according to the colour of their photosynthetic pigments.

Section DAnswer any *Six***(Short-essay questions; each question carries a weightage of 2)**

19. Give an account of the thallus variation found in the members of chlorophyceae with suitable diagrams.
20. List any four resemblances and four differences between basidiomycetes and ascomycetes
21. Write an account on asexual reproduction in Algae
22. Give an account of habit, structure and method of reproduction of *Nostoc*.
23. With the help of diagram describe the internal features of *Peziza* apothecium.
24. With labelled diagrams compare the structure of TMV and Bacteriophages.
25. Write about the economic importance of Virus.
26. Explain the general characteristics of Cyanobacteria.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. On *Puccinia graminis tritici* both heterothallic and heteroecious conditions occur. Illustrate your answer with suitable sketches
28. Describe the structure and reproduction of *Polysiphonia* with the help of suitable diagrams. Add a note on its life cycle.
29. 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.

B.Sc. Botany/Plant Science**CORE – 9****DIVERSITY OF LIFE-2: BRYOLOGY, PTERIDOLOGY AND GYMNOSPERMS****Course Code: 5B09BOT/PLS****No. of credits- 3****No. of contact hours- 54+36****Objectives .**

- To get a comparative knowledge of plants- and their life cycle.
- To understand the interrelationships between plants.
- To make the students aware of the morphological, anatomical and reproductive features of primitive and advanced plants and their evolutionary link.
- To enable the student to appreciate their ecological importance and the need of conserving them.
- To develop curiosity in observing and identifying different groups of plants

Course Outline**(Questions for theory examination will cover the Types mentioned for practicals also.)****Module I- Bryology-****(16 hrs.+ 12 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 the following classes (Developmental details not required)– hepaticopsida, anthocerotopsida, bryopsida - 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.

Practical-**12 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..

Module 2- Pteridology**(21 Hrs+ 12Hrs)**

Pteridophytes- Introduction - Salient features and Classification (Reimer's)- Study of the habitat, distribution, habit, anatomy, reproduction and life cycle of the following classes (Developmental details are not required) – Psilotopsida, Lycopsidea, Sphenopsida, Pteropsida (Filicopsida)- 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- ecology and economic importance of pteridophytes.

Practicals-**(12 Hrs)**

1. *Psilotum* : external features, stem T.S., synangium T.S
2. *Selaginella*: habit , rhizophore T.S, stem T.S ,axis with strobilus, Megasporophyll and

Microsporophyll

3. *Equisetum* – Habit, rhizome T.S, stem T.S., strobilus V.S.

4 *Pteris*- Habit, petiole T.S., sporophyll T.S., prothallus

5. *Marsilea*- Habit, rhizome and petiole T.S, Sporocarp T.S, V.S & R.L.S.

Module 3- Gymnosperms

(17 Hrs + 12 Hrs)

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

Practical -**12 Hours**

1. *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.
2. *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.
3. *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.

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KANNUR UNIVERSITY EXAMINATION
Theory -Plant Science/Botany Model Question Paper

CORE COURSE- 9
5B09BOT/PLS-

DIVERSITY OF LIFE-2 BRYOLOGY, PTERIDOLOGY AND GYMNOSPERMS

Time: 3 Hours

Total Weightage: 30

Draw diagrams wherever necessary

Section - A

Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Intercalary meristem occurs in
 - a) *Marsilea* b) *Equisetum* c) *Selaginella*
 - d) *Lycopodium*
- ii) Winged pollen grains are seen in
 - a) *Pinus* b) *Cycas* c) *Gnetum*
 - d) *Ephedra*
- iii) The cap-like structure covering the capsule of Moss
 - a) stomium b) annulus c) operculum d) peristome
- iv) Pseudoperianth is seen in
 - a) *Riccia* b) *Marchantia* c) *Funaria*
 - d) *Anthoceros*

2. State true or false

- i) *Adiantum* is commonly known as maiden hair fern.
- ii) Canada balsam, used as a mounting material comes from *Pinus*
- iii) *Riccia* sporophyte has foot and capsule.
- iv) In *Gnetum* the xylem shows typical characteristics of Gymnosperms..

3. Fill in the blanks

- i) A siphonostele which is divided into several meristele is described as-----
--.
- ii) Antheridial clusters in moss are commonly known as-----.
- iii) The loose textured wood of *Cycas* is described as -----.
- iv) bundle in which xylem surrounds phloem is described as-----.

4. Match the following

A	B
i) Trabeculae	<i>Pinus</i>
ii) Bars of sanio	<i>Marchantia</i>
iii) elaters	<i>Marsilea</i>
iv) Sporocarp	<i>Selaginella</i>

5. Answer in one word or in one sentence

- i) Gemmae
- ii) yellow clouds
- iii) Ligule
- iv) Where do you notice columella?

Section B**Answer any 4 of the following: (Each question carries a weightage of 1)**

6. What is meant by a eusporangiate sporangium development?
7. Explain the dehiscence of sporangium in *Adiantum*.
8. What evidence can you cite to indicate that *Cycas* is a living fossil?
9. Mention the special features of *Riccia* antherozoids.
10. Name two species of *Rhynia*.
11. Write any two distinguishing features of Anthocerotopsida.

Section C**(Short answer questions. Answer any five; each question carries a weightage of 1)****Differentiate the following**

12. Endodermis in the stem of *Selaginella* and that of *Equisetum*.
13. Archegonium of Hepaticopsida and Anthocerotopsida.
14. Compression and petrification.
15. Vallecular canal and carinal canal.
16. Sporophyte of *Riccia* and *Funaria*.
17. Pteridophytes and gymnosperms.
18. Coralloid root and Rhizophore.

Section D**Short answer questions. Answer any six; each question carries a weightage of 2.**

19. Give an account of the vegetative reproduction in Bryophytes.
20. Economic importance of Bryophytes.
21. Mention the xerophytic characters of *Pinus* needle with the help of a diagram.
22. Give an account of Microsporophyll of *Cycas*, with the help of a diagram.
23. Explain the structure of the gametophyte of *Psilotum* with the help of a labeled diagram.
24. Give a brief description of the micro and mega gametophytes of *Selaginella*.
25. Write a short note on *Lyginopteris*.
26. Contribution of Birbal Sahni in the field of Palaeobotany.

Section E**(Essay type question. Answer any one; each question carries a weightage of 4)**

27. Bottles containing stems of *Lycopodium*, *Selaginella* and *Equisetum* have mixed up due to the negligence of the laboratory assistant. How will you help him so as to give a correct labeling?
28. Write down the Economic importance of Gymnosperms
29. Justify the statement that in *Anthoceros* there is remarkable association of a simplest gametophyte with a highly evolved sporophyte.

B.Sc. Botany/Plant Science
CORE-10

**CORE PRACTICAL-I -METHODOLOGY, INTERMEDIARY METABOLISM,
 BIOMOLECULES, CELL BIOLOGY, PALEONTOLOGY, GENETICS AND
 BIOINFORMATICS.**

Code : 5B10BOT/PLS

Credit: 4

Contact Hours : 216 Hrs(semesters1,2,3,4& 5)

Aim & Objectives

- 1.To train the students in the use and maintenance of scientific equipment in biology.
2. To develop in them the scientific way of doing and making them understand that there are many models of experimentation that are possible.

Eligibility to appear for Practical exam of 5B10BOT/PLS

1. Certified Practical Record
2. Collection and submission of TEN lower groups of plants with a brief report.
3. Visit Report

Course outline

Methodology of Sciences -Practicals

36 Hrs

1. Work out problems on measures of central tendencies, measures of dispersion.
2. Measurement of specimens using micrometer.
3. Photomicrography and camera lucida drawings.
4. Familiarizing with different biological instruments.
5. Collection, identification and submission of plants by using different preservation methods.

Methodology of Botany-Practicals

36 Hrs

1. General awareness of Micro technique - maceration, smears & squash
2. Demonstration of microtome sectioning and hand sectioning
3. Separation of plant pigments by paper chromatography.
4. Demonstration of Emasculation and Hybridization, budding, grafting and layering.
5. Study of pollen morphology of the following plants –*Hibiscus*, *Vinca*, *Balsm*, *Ixora*, *Crotalaria*, *Bougainvillea*.
6. Acetolysis of pollen grains
7. Preparation of buffer.
8. Measurement of pH.
9. Construct the absorption spectrum of any sample.
10. Visit to Laboratories.

Informatics Practicals -**36 Hours**

1. Create, Copy and Save a document with Header, Footer, Page No., Date & Time using any software.
2. Insert a table in the above document.
3. Prepare the mark list of students using any applicable software.
4. Create five slides using any applicable software, with different design templates.
5. Students are expected to work with at least any one of the commercial/ scientific packages, to explore the WEB and able to find, recognize, download, install and use software in various areas useful to the research of Biology.

Energy and Intermediary Metabolism- Practical**18Hrs**

1. Extraction of invertase (from any source)
2. Assay of invertase
3. pH dependent activity profile of enzymes
4. Calorimetric estimation of reducing sugars in germinating seeds
5. Demonstration of Hill reaction
6. Separation of leaf pigments by paper chromatography/Column chromatography/ TLC
7. Effect of light intensity on photosynthesis by Wilmot's bubbler
8. Kuhnes fermentation experiment
9. Respirometer experiment
10. Experiment to show anaerobic respiration

Biomolecules and Cell Biology Practicals**36Hrs**

1. To prepare molar, molal, normal and percent solutions.
2. Qualitative test for carbohydrate, aminoacid and protein
3. Quantitative test for sugar in a given solution
4. Quantitative test for sugar in biological samples
5. Estimation of protein and DNA
6. Chromatographic methods for the separation of macro and micro molecules
7. Make acetocarmine squash preparation of onion root tips and to identify different stages of mitosis

Genetics -Practicals**36 hrs**

Meiosis- To make smear preparations of the flower buds of any one of the following Plants- Rhoeo, Tradescantia, Capsicum, Coix

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

Paleontology Practical-**18hrs**

1. Fossil pteridophytes- Rhynia Stem, Lepidodendron, Lepidocarpon.
2. Fossil Gymnosperm- Lyginopteris

Code:

Reg. No.:

Name:

KANNUR UNIVERSITY EXAMINATION**Plant Science/Botany- B.Sc. Practical- Model Question Paper
BOTANY (Core Practical-I)****5B10BOT/PLS - METHODOLOGY, ENERGY AND INTERMEDIARY
METABOLISM, BIOMOLECULES, CELL BIOLOGY, PALEONTOLOGY,
GENETICS AND BIOINFORMATICS.****Time: 4 Hours****Max. Weightage= 30**

1. Prepare a standard graph and estimate colorimetrically the quantity of protein/total sugar reducing sugar from the given sample i) and write down the principle and procedure (Estimation- 3; Principle- 0.5; Procedure- 0.5) (Weightage-4)
2. Determine the presence of Protein/reducing sugar/amino acid/sucrose/starch/-- in the given sample ii) by conducting appropriate test. Write down the principle and procedure (Procedure-1; Skill- 1; General test-1; Confirmatory test-1) (Weightage -4)
3. Adjust the pH of the given buffer to --- by pH meter /Measure the pH of the given sample iii) and write down the procedure (Skill- 1.5; Procedure-0.5) (Weightage-2)
4. Separate the given sample iv) chromatographically (Weightage-2)
5. Prepare an acetocarmine squash of v) and identify two clear stages of mitotic division with reasons, draw a labeled diagram of each stage and report for valuation. (Preparation -1; stages-1; labeled diagrams -1; reasons-1) (Weightage- 4)
6. Measure the size of the given specimen vi) using micrometer. (Skill-1; Calculation-1) (Weightage- 2)
7. Spot at sight vii), viii), ix) and x) (Weightage 1x4= 4)
8. Work out the problems xi) and xii) (Weightage-4+2)
9. Set up an experiment xiii) in relation to Photosynthesis or Respiration (Weightage- 2)

KEY TO THE SPECIMENS

- i)** Carbohydrate\ Protein; BSA
- ii)** Reducing or non reducing sugar\ starch\ protein
- iii)** Any buffer solution
- iv)** Plant pigment
- v)** Onion root tip
- vi)** Algal filament\ pollen grain\ xylem element
- vii)** Fossil type mentioned in the syllabus
- viii)** Pollen of any plant mentioned in the syllabus
- ix)** Any part of compound microscope\ microtome
- x)** Bioinformatics
- xi)** Dihybrid/ allelic interaction/Three point /two point test cross
- xii)** Chi-square analysis/ non allelic interaction
- xiii)** Intermediary Metabolism

Scheme of questions

Quest.No.	Subject	Weightage
1	Intermediary Metabolism	4
2	Biochemistry	4
3	Methodology of Botany	2
4	Methodology of Botany	2
5	Cell Biology	4
6	Methodology of Botany	2
7	Paleobotany, Methodology of Botany, Bioinformatics	1+1+1+1
8	Genetics	4+2
9	Intermediary Metabolism	2
	Total	30

B.Sc. Botany/Plant Science**CORE – 11****DIVERSITY OF LIFE-3- ANGIOSPERM SYSTEMATICS AND MORPHOLOGY****Course Code: 6B11 BOT/PLS****No. of credits- 2****No. of contact hours- 36+ 54****Aim of the Course**

To enable the proper description, identification, naming and classification of higher plants-angiosperms- to conserve.

Objectives:

1. To observe the variations among plants, especially angiosperms.
2. To understand the way of description of a plant.
3. To study the floral characters with an aim to identify the taxa authentically.
4. To prepare taxonomic keys with the help of morphological and floral characters and to classify plants based on similar/dissimilar characters
5. To study the various types of floral distribution in Northern Kerala
6. To apply taxonomic data into various other fields.
7. This study enriches the systematic Botany which can be utilized for botanical diagnosis of fragmentary crude drugs.
8. This study will be useful in identifying medicinal taxa.
9. This study also helps in knowing the preliminary phytochemistry of plant organs

Course Outline

(Questions for theory examination will cover the Types/families for practicals also.)

Angiosperm systematics**(28 hrs+ 48 hrs)****Module-1- Systematics :****8 hrs**

Objectives and relevance, History of Taxonomy in India

Systems of classification-Artificial, Natural and Phylogenetic; Brief account of Linnaeus', Engler & Prantl's, Hutchinson's and APG-II (2003) classification.

A detailed study of Bentham & Hooker's system-merits and demerits.

Module- 2 : Plant nomenclature:**6 hrs**

Principles and rules of Botanical Nomenclature, ICBN, Latest code –brief account, Rank of taxa, Type concept, Rule of priority, Author citation. Plant identification: Taxonomic literatures- Floras, Manuals, Monographs and Revisions, Construction and use of Keys. Important Herbaria, Botanical gardens.

Module- 3 - Recent trends in Taxonomy**4 hrs**

Morphology in relation to taxonomy, Anatomy in relation to taxonomy, Embryology in relation to taxonomy, Chemotaxonomy, Cytotaxonomy, Molecular taxonomy and Numerical taxonomy - brief account only.

Module- 4 - Diagnostic features**10 hrs**

Study of the diagnostic features of the following orders and series of Bentham and Hookers system and the families mentioned for practicals with a brief account of the economically important plants:

Ranales, Parietales, Malvales, Geraniales, Sapindales, Rosales, Myrtales, Passiflorales, Umbellales, Rubiales, Asterales, Gentianales, Polemoniales, Personales, Lamiales, Curvembryae, Unisexuales, Microspermae, Epigynae, Coronarieae, Calycineae, Glumaceae

Practical -**48 Hours**

1. Study of taxonomic features and economic importance of representative members* of the following families.

Annonaceae, Nymphaeaceae, Capparidaceae, Malvaceae, Rutaceae, Anacardiaceae, Papilionaceae, Mimosaceae, Caesalpiniaceae, Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae, Scrophulariaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, 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 30 herbarium specimens representing all 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 for at least 7 days.

*Representative members- *Annona*, *Mangifera*, *Anacardium*, *Eucalyptus*, *Mimosa pudica*, *Saraca indica*, *Coccinia indica*, *Ferula asafoetida*, *Ixora*, *Cinchona*, *Eclipta alba*, *Vernonia*, *Gymnema*, *solanum torvum*, *Scoparia dulcis*, *Coleus aromaticus*, *Amaranthus viridis*, *Ricinus communis*, *Allium cepa*, *Allium sativum*, *Cocos*, *Oryza*.

Module- 5 - Angiosperm Morphology (Theory 8 hrs, Practical 6 hrs)

Vegetative and floral morphological features

Leaf morphology (terminology)- Arrangement-phyllotaxy, ptyxis and vernation; Leaf texture-chartaceous, coriaceous, glabrous, glaucous, pubescent; Domatia and glands; Leaf shape-ovate, obovate, elliptic, oblong; Leaf margins-unlobed, lobed, plane, revolute; Leaf apex – acute, obtuse, emarginate, truncate; Leaf base- acute, obtuse, truncate, cordate, sagittate; Venation-organization of major veins-pinnate, palmate, parallel.

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.

Practical**6 Hours**

1. Leaf submission as an album to study the diversity in leaf shape, tip, base, margin and venation

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

3. Submission of preserved materials of various inflorescences of racemose, cymose and mixed/special types.

References:

1. Datta S C, *Systematic Botany*, 4th Ed, Wiley Estern Ltd., New Delhi, 1988.
2. Eames A. J. - *Morphology of Angiosperms* - Mc Graw Hill, New York.
3. Heywood - *Plant taxonomy* - Edward Arnold London.

4. Jeffrey C .J. and A. Churchil - *An introduction to taxonomy* – London.
5. 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.
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11. Singh V. & Jain - *Taxonomy of Angiosperms* - Rastrogi Pubs, Meerut.
12. Singh G.1999. *Plant systematics: Theory and Practice*. Oxford and IBH, Pvt.Ltd.New Delhi.
13. Sivarajan V. V - *Introduction to Principles of taxonomy* - Oxford &I B H New Delhi.
14. Takhtajan - *Flowering Plants* - Edinburg, Oliver & Boyd.
15. Vashishta P. C - *Taxonomy of Angiosperms* - Chand & Co, Meerut.
16. Vasudevan Nair, R - *Taxonomy of Angiosperms* - APH Pub: New Delhi
- 17.Venkateswaralu, V. - *Morphology of Angiosperms* - Chand & Co.

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KANNUR UNIVERSITY EXAMINATION
Theory -Plant Science/Botany Model Question Paper

6B11 BOT/PLS- DIVERSITY OF LIFE-3 -ANGIOSPERM SYSTEMATICS AND MORPHOLOGY

Time: 3 Hours

Total Weightage: 30

Draw diagrams wherever necessary

Section - A

Answer All

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Tautonyms are
 a) Different names used for same taxon
 b) Names with specific epithet exactly repeats the generic name
 c) Names which have older valid names
 d) Identical names given to different taxa
- ii) Glabrous surface of lamina is
 a) Smooth without any hair
 b) Shining and covered with waxy coating
 c) Rough with short rigid points
 d) Covered with hairs
- iii) Statistical methods used in taxonomy
 a) Numerical
 b) Adansonian
 c) Phenetic
 d) All of the above
- iv) A monocarpic palm is
 a) Areca b) Borassus c) Elaeis d) Corypha

2. State true or false

- i) A monograph is an inventory of plants of limited geographical area .
 ii) Rotate corolla is gamopetalous with limb at right angles to the short tube
 iii) Fruit of Datura is a septicidal capsule
 iv) S type Sieve tube plastid used in delimitation of taxa accumulates protein

3. Fill in the blanks

- i) The taxon with single morphological pollen type is called
- ii) Anthoxanthin and anthocyanin belong to the group of naturally occurring phenols called
- iii) Branched stamens are seen in
- iv) Drug obtained from dried roots of Rauwolfia serpentina is

4. Rearrange column B and C to match column A

	A	B	C
i	Monocarpellary superior ovary	Axile	Hesperidium
ii	Polycarpellary superior apocarpous	Apparently Basal	Legume
iii	Polycarpellary superior syncarpous	Parietal	Etario of berries
iv	Tricarpellary inferior syncarpous	Marginal	Pepo

5. Answer in one word or in one sentence

- i) Botanical name of Star anise
- ii) Specimen used by the author as nomenclatural type
- iii) The internode between corolla and androecium .
- iv) Botanical gardens where only woody species are grown.

Section BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. Manual and Flora
7. Phenetics and Cladistics
8. Binary characters and multistate characters
9. Apocynaceae and Asclepiadaceae.
10. Holotype and Lectotype
11. Coronarieae and Calycineae

Section CAnswer any *Five***(Short answer questions; each question carries a weightage of 1)**

- 12 Enumerate embryological features of Orchidales helpful in taxonomic delimitation of the order.
13. Describe the inflorescence of Moraceae.
14. Write the binomial of any two gourds.
- 15 Briefly explain the floral features of Passiflorales
16. What is Placentation? Mention the different types.
- 17 Explain the different types of gynoecium in Nymphaeaceae.
18. Bring out the role of terpenoids in the diversification of family Asteraceae.

Section D**Short essay questions. Answer any five; each question carries a weightage of 2.**

19. Write the botanical name, family, morphology of the useful parts and uses of any three pulses.
- 20 Explain the different types of Androecium seen in members of Cucurbitaceae
- 21 What is Rule of Priority? Comment on its applications.
- 22 What are the different cytological characters useful in taxonomy? Explain their role in solving taxonomic problems.
- 23 With suitable diagrams describe the mixed type of inflorescence.
- 24 Briefly explain the methods involved in the preparation of herbarium specimens. Add a note on the significance.
- 25 With the help of diagram explain the spikelet of Poaceae.
- 26 Enumerate the guidelines for construction of Dichotomous Keys.

Section E**Essay type question. Answer any one; each question carries a weightage of 4**

27. Give the outline of the system of classification proposed by Bentham and Hooker In what respect it is different from that of Hutchinson.
- 28 Discuss how numerical taxonomy could be used as an effective tool in plant classification.
- 29 Describe the characters of Ranales Add a note on its primitive features.

B.Sc. Botany/Plant Science**CORE – 12****PLANT FORM AND FUNCTION-1- ANGIOSPERM ANATOMY AND REPRODUCTIVE BOTANY****Course Code: 6B12 BOT/PLS****No. of credits- 3****No. of contact hours- 54 + 36****Aim of the Course**

The internal structure of plants and the reproduction gives an idea of major elements of variation.

Objectives:

1. To observe and differentiate the variations existing in the internal structure of plants.
2. To create interest in plant anatomy and to appreciate the function of a particular tissue or organ correlated with its structure.
3. To enable the student understand the anatomical features with in the system instead of merely memorizing the technical terms and the text book figures.
4. To identify different plants with respect to its anatomical features though they are not studied as part of the syllabus.
5. To enable a comparison existing among different parts in different plants. And enable the student in identifying different plants by anatomical peculiarities.
6. To know the development and to understand the life cycle of angiosperms and variations existing among them from flower to seed.

Angiosperm Anatomy: -**40 hours****Module 1- Cell inclusions -3 hrs**

Introduction, Objective and scope of Plant Anatomy – general structure of higher plants-cell wall- chemical nature of cell wall – microscopic and submicroscopic structures of cell wall – formation of walls – growth of walls

Module 2 Tissues - 17 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 – Définitions, Classification – simple, complex and spécial tissues – secretory cells.

Module 3 Structure of plant body -20 hours

Primary vegetative body of the plant-stem – ontogenic development –arrangement of primary 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 – Brief account- wood identification -Wood anatomy in relation to phylogeny – Brief account -Ecological anatomy – Hydrophytes, Xerophytes and Halophyte.

Practicals: -**(26 hours)**

1. Non living inclusions – Cystolith, Raphides, Aleurone grains.
2. Starch grains – Eccentric, concentric, compound
3. Apical meristem – Root apex and stem apex.

4. Simple permanent tissues – Parenchyma, Chlorenchyma, Aerenchyma, Collenchyma and Sclerenchyma.
5. Primary structure – Dicot stem – Hydrocotyle, Cephalandra, Eupatorium or any dicot stem.
6. Monocot stem – Bamboo, Grass, Asparagus or any monocot stem.
7. Dicot root – Tinospora, Ficus, Pea
8. Monocot root – *Colocasia*, *Hedychium*, *Pandanus* or any monocot root.
9. Secondary structure – Stem (Normal type) – *Tinospora*, *Thithonia*, *Vernonia* or any other normal type.
10. Secondary structure – Root (Normal type) – *Tinospora*, *Ficus*, *Carica papaya*, *Ricinus* or any other normal type.
11. Secretory tissues – Resin canal, Nectory, Latex vessel, Lysegenous and schizogenous cavities, Laticifers – articulated and non-articulated latex vessels.
12. Epidermal structures – Trichomes, Hairs, Glands, Stomata.
13. Anomalous secondary thickening – *Bignonia*, *Dracaena*, *Boerhaavia*.
14. Leaf Anatomy – Dicot leaf: *Ixora*; Monocot leaf: Grass

Reproductive Botany

Theory–14 Hrs

Module 4 - Reproductive Botany -

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 – Ruminant) -Embryo – Structure and development of Dicot embryo (*Capsella* type), Monocot embryo (*Najas*). Polyembryony – Classification and Significance-Apomixis-vegetative reproduction - Agamospermy- apospory and parthenocarpy.

Palynology - Pollen structure and Morphology, Economic importance, Pollen allergy-

Practicals

10 hrs

1. Identify C.S of Anther; Dicot embryo, Monocot embryo and eight nucleated embryo sac.
2. Study of the different stages of anther development.
3. Pollen germination test.
4. To dissect and display early stages of embryo development- *Tridax/ Crotalaria*.

References:

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KANNUR UNIVERSITY EXAMINATION
Theory -Plant Science/Botany Model Question Paper

CORE COURSE-12

**6B12 BOT/PLS- PLANT FORM AND FUNCTION-1- ANGIOSPERM ANATOMY
AND REPRODUCTIVE BOTANY**

Time: 3 Hours**Total Weightage: 30***Draw diagrams wherever necessary***Section - A***Answer All***(Questions in bunches of four; Each bunch carries a weightage of 1)**

1. Choose the correct answer

- i) Most common type of ovule is
 - a) Anotropous b) Orthotropous c) Amphitropous d) Circinotropous
- ii) Xylem and phloem occurs side by side
 - a) Concentric b) Collateral c) Radial d) Bicolateral
- iii) Digestive glands are present in
 - a) Papaya b) Ocimum c) Nepenthes d) Euphorbia
- iv) Among these, which is a nitrogenous waste product?
 - a) Gum b) Caffeine c) Tannin d) Resin

2. State true or false

- i) Exine of the pollen grain is mainly sporopollenin
- ii) The ovule has a stalk called funicle
- iii) Amphicribal vascular bundles are found in Dracaena.
- iv) Ray initials produce medullary rays.

3. Fill in the blanks

- i) The main body of the ovule enclosed in
- ii) The leaves in the gymnosperm contain a peculiar conducting tissue called.....
- iii) Helobial endosperm present in.....
- iv) Star-shaped sclereids are

4. Match the following

A	B	C
i) Hay fever	Sieve tube	Glandular tissue
ii) Perforation plate	Allergy	Endosperm
iii) Acetyl choline	Embryosac	Phloem
iv) Secondary nucleus	Stinging hair	Pollen

5. Answer in one word or in one sentence

- i) porogamy
- ii) quiescent Centre
- iii) Liquid endosperm
- iv) Tyloses

Section -B*Answer any Four***(Differentiate the following: Each question carries a weightage of 1)**

6. Microspore and Megaspore

7. monospric and tetrasporic embryosac
8. Lysigenous glands and Schizogenous Glands
9. Exalbuminous Seeds and Albuminous Seeds.
10. Storied Cambium and Non-storied Cambium.
11. Crystalloids and Globoids.

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Enumerate the functions of Tapetum.
13. Discuss about the applications of parthenocarpy in Agriculture.
14. With suitable examples, describe the reserve food materials seen in plants.
15. What is Dendrochronology?
16. Explain the structure of isobilateral leaf.
17. Write brief note on reserve food of plant cell.
18. Write about the primary structure of dicot root.

Section D

Answer any *Six*

(Short-essay questions; Each question carries a weightage of 2)

19. Describe the structure of Polygonum type of embryosac.
20. Give an account of latex vessel.
21. Explain the significance of apomixes.
22. Draw a labeled sketch of of T.S. of young anther.
23. Give an illustrated account on the different types of vascular bundles met within dicotstems. Mention examples.
24. Describe the cell wall organization and types of pits.
25. Write briefly about periderm formation in dicot stem.
26. with a neat labeled diagram describe the structure of the organ which give out liquid water.
- 27.

Section E

Answer any *One*

(Essay- type questions; Each question carries a weightage of 4)

28. With the help of diagram explain megasporogenesis.
29. Describe the various theories related to meristem.
30. What is anomalous secondary thickening? Explain the type of secondary thickening in Boerhaavia stem.

B.Sc. Botany/Plant Science**CORE – 13PLANT FORM AND FUNCTION-2- PLANT PHYSIOLOGY****Course Code: 6B13 BOT/PLS****No. of credits- 2****No. of contact hours-36 +18****Aim of the Course**

To understand the functioning of plant molecules, plant cells and plant body

Objectives

- To understand the physical principles which is needed to explain the mechanism of plant living and growth
- To enable the students in understanding the function of plants with respect to its environment and structure.
- To develop appreciation in the wonderful mechanism of transport system exist in plants.
- To create research interest and observation skill by introducing the way by which plant physiology researches were carried out.

Course Outline**Module-1****(12 Hrs)**

Introduction-The science of plant physiology-Retrospective-Practical applications

Water as a plant constituent-Function of water in plants-The water molecule-diffusion and osmosis-osmotic pressure- DDP-water potential-The components of water potential.

The plant in relation to water-Water loss by transpiration-Mechanism of stomatal guard cell movement-K⁺ion transport-Antitranspirants-Mechanism of water absorption and transport-The cohesion- transpiration pull theory-Merits and Demerits-Testing with xylem anatomy-Water stress and its physiological consequences-Drought tolerance-salinity stress-Pathway of discovery; Studying water, minerals and roots: Paul .J. Kramer.

Module-2**(12Hrs)**

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

Transport in the phloem-source –sink relationship and translocation in sieve tubes-- testing with phloem anatomy- Evidences of phloem transport.-experiments- phloem loading and unloading- Mechanism of sieve tube translocation-Pressure flow hypothesis-Photosynthesis and sink demand-Hormone directed transport-Turgor sensing in sugar transport-The control of fruit and vegetable composition.- Assimilate partitioning and control mechanism- Pathway of discovery-Discovery of the empty ovule technique by John- H- Thorne(Ref;salisbury and Rose 4e)

Module-3**(12 Hrs)**

Plant Growth and development - Growth and Development-What is meant by Growth?- Patterns of growth and development-some features of plant growth. Steps in cell growth and development-Growth kinetics-Growth through time-S-shaped Growth curve.-Growth-Vegetative growth-Reproductive growth-Principal events of reproductive growth-The flowering stimulus-Florigen concept-Ageing-Senescence and death. –

Hormone and Growth regulation-Concept of hormone and their action-Auxin, Gibberellin,Cytokinin,ABA,and Ethylene-physiological role, A brief outline of the chemistry and biosynthesis.

The power of movement in plants- Nastic movement-Nyctinastic and seismonastic movement, Tropism –Directional Differential growth- phototropism and Gravitropism

Pathway of discovery -Studying the gravitropic response of cereal grasses-Peter.B-Kaufman-case study (Ref;Salisbury4e)

Photomorphogenesis- Pathway of discovery Discovery of phytochrome – Stereling–B Hendrickson-Physiological effects of phytochrome- Photoperiodism Flowering Role of light in seed germination-Physiology of seeds-Seed germination- Morphology and biochemical changes accompanying seed germination.

Practicals**(18Hrs)****Plant Physiology Practical****(18Hrs)**

1. Determination of water potential by tissue weight change method
2. Water potential of onion peel/Rheo peel by plasmolytic method
3. Effect of temperature on permeability
4. Papaya petiole osmoscope/simple osmoscope/potato tuber osmoscope
5. Determination of stomatal index
6. Comparison of rate of transpiration by the upper and lower surface of the leaf by cobalt chloride method
7. Relationship between water absorption and transpiration
8. Determination of the rate of transpiration using Ganongs potometer
9. Effect of scarification on seed germination
10. Photomorphogenesis in seedlings grown under normal light and darkness
11. Testing of seed viability by tri phenyl tetrazolium chloride.
12. Determination of gravitropism using clinostat

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Code:

Reg. No:

Name:

KANNUR UNIVERSITY**B.Sc. Botany/Pant Science- Theory Model Question Paper****CORE-13****6B13 BOT/PLS - PLANT FORM AND FUNCTION-2- PLANT PHYSIOLOGY****Time: 3 Hours****Total Weightage: 30****Section A**

(Objective questions (Multiple choice /one word/sentence/ fill in the blanks /Match the following, true or false etc.) in cluster of four. Each cluster carries a weightage of 1

1. Choose the correct answer

- i) Which of the following GA is immediate precursor of all other GA's in plants
a) GA₁ b) GA₂ c) GA₁₀ d) GA₁₂

 - ii) Which of the following elements is essential for the synthesis of chlorophyll?
a) Calcium
b) Potassium
c) Manganese
d) Manganese

 - iii) A plant, by opening and closing its stomata, must achieve a balance between
a) Oxygen loss and water uptake
b) Carbon dioxide loss and sugar uptake
c) Water loss and carbon dioxide uptake
d) Sugar loss and oxygen uptake

 - iv) Which of the following is not a specific physiological effect of gibberellin?
a) Elongation of internodes
b) Bolting and flowering
c) Synthesis of alpha amylase
d) Ripening of fruit
- 2. i) Differential distribution of photo assimilates in different sinks of the plant is called as**
(a) Separation of assimilates
(b) Assimilates partitioning
(c) Storage of photo assimilates
(d) Photo assimilates consumption
- ii) If a cell A has an osmotic pressure of 25 atm and T.P of 15 atm. and cell B has O.P of 30 atm and T.P of 10 atm. Then the movement of water will occur from
a) Cell B to cell A
b) Cell A to cell B
c) Both directions
d) No movement of water
- iii) Which of the following is not a deficiency symptom of phosphorus?
a) Premature leaf fall
b) Necrotic areas on leaves or fruits
c) Chlorosis of leaves

- d) Dark green coloration of leaves
- iv) Which of the following is not a specific physiological effect of gibberellin?
- Elongation of internodes
 - Bolting and flowering
 - Synthesis of alpha amylase
 - Ripening of fruit

3. State true or false

- Seed germination is a phytochrome mediated photoresponse
- Xanthium is a longday plant
- An essential plant nutrient required for the regulation of stomatal opening and closing is calcium
- Vernalization shortens the vegetative period and hastens flowering

4 Answer in one word or in one sentence

- In rainy season the doors and windows swell up due to-----
- Name the amino acid that act as a precursor for the biosynthesis of IAA
- The amount by which the diffusion pressure of the solvent molecules in a solution is lower than that of the pure solvent at identical temperature and atmospheric pressure is called
- Name any method to measure the rate of transpiration

5. Rearrange column B and C to match column A

i)	auxin	cell division	F.W.Went 1928
		Arrest of the cell division	
ii)	gibberellin	Increase in mineral uptake	Ohkuma.et.al 1965
		Anti transpirant	
iii)	Abscisic acid	Fruit ripening	Skoog and miller 1955
		Elongation of the internode	
iv)	Cytokinin	Stoppage of guttation	Sumuki and Yabuta 1938
		Apical dominance	

Section B

Answer any four of the following. (Each question carries a weightage of 1)

Differentiate any four of the following

- Active and passive absorption of water
- D.P.D and water potential
- Transpiration and guttation.
- Phototropism and photoperiodism
- Drought stress and salinity stress.
- Photo taxis and chemotaxis

Section C**(Short answer questions. Answer any five; each question carries a weightage of 1)**

12. Define the term "growth" as applied to plants. How can plant growth be measured?
13. What is turgor pressure? Can plant cells have negative turgor pressure values? Can you calculate the turgor pressure of a cell from water potential and osmotic potential values?
14. Discuss various types of senescence that can occur during plant development." Is senescence synonymous with "necrosis" (death)? Explain your answer.
15. Write note on critical photoperiod.
16. What are the causes of seed dormancy?
17. Evaluate the practical application of vernalisation in a tropical country like India.
18. The cell sap of the roots of halophytic plants has normally higher osmotic pressure than that of the cell sap of mesophytic plants.why?

Section D**Short answer questions. Answer any six; each question carries a weightage of 2.**

- 19) Assume that a plant cell with a water potential of -1.0 bar is placed in a beaker containing a sucrose solution that has a water potential of -4.0 bar Further, assume the temperature of the solution is 24 C. Thus:
 - i) The plant cell will become a.) larger b.) smaller c.) not change
 - ii) The weight of the plant cell will :a.) increase b.) decrease c.) not change
 - iii) The concentration of the sucrose solution in the beaker will: a) increase b). decrease c). not change.
 - iv) The turgidity of the plant cell will a.) increase b). decrease c). not change
 - v) The osmotic potential of the sucrose solution will become
 - a). more negative
 - b). less negative
 - vi) There will be a net movement of water from the
 - a). cell to the solution
 - b). solution to the cell
 - vii) The cell will likely plasmolyse a). False b) True
20. What is a mineral deficiency? How can a mineral deficiency be recognized? How can farmers benefit from nutrient analysis?
21. Discuss the mechanism of absorption of mineral salts by plants. How does it differ from absorption of water?
- 22 During the course you might have gone through a number of practical techniques used in the study of whole plant physiology. Discuss any one of these techniques.
- 23 "Explain how light leads to the opening of the stomata on the leaves of higher plants"
24. Describe the theory which you think best explains the mechanism underlying the translocation of organic solute through phloem.
25. How would you proceed to make a waterculture? Explain the effects on plant of the omission of the salts of calcium, phosphorus and magnesium respectively?

26. Write an account on 'The resistance of plants to stress'.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Discuss the movement of water throughout a higher plant

28. What is a phytohormone? How many kinds of them are known to you? Describe atleast two phytohormones mentioning its structure, function and synthesis.

29. What is an essential element? How many have been identified? What is the difference between an essential element and a beneficial one? Provide examples. Give deficiency symptoms and roles of any three macro elements and one micro element.

B.Sc. Botany/Plant Science**CORE- 14****BIOTECHNOLOGY, NANOBIO TECHNOLOGY AND PLANT TISSUE CULTURE****Course Code: 6B14BOT/PLS****No. of credits- 3****No. of contact hours- 54+18=72 hrs****Aim and objectives**

1. To know the fundamental techniques of biotechnology and the history of its development.
2. To orient them to apply the technology in agriculture and other fields.
3. To make them aware of the economic, social and environmental problems of gene manipulation
4. To acquaint and train them in the use of the equipments in biotechnology
5. To understand the application of bio technology and nanobiotechnology.

Course Outline**Module-1- Introduction –Emergence of Biotechnology****20Hrs**

Recombinant DNA and Molecular cloning- Restriction Endonucleases-Ligases and other DNA modifying Enzymes (cutting, modifying and joining DNAmolecules)

Cloning vectors- Plasmids-Bacteriophages-Hybrid Vectors-Binary and shuttle vectors. PBR322, PUC, λ phage. Ti and Ri Plasmids. Construction of recombinant DNA methods.

Polymerase chain reactor- methodology-essential features-application

Getting DNA into cells-Vector method.Agrobacterium mediated gene transfer-Direct DNA uptake-Electroporation-shot gun method-microinjection -

Strategies of molecular cloning - Screening, selection and analysisof recombinants, Molecular probes-Colony Hybridisation-insitu hybridization-southern.northern western blotting-RFLP- RAPD, -FISH- DNAand RNA Fingerprinting-Genomic Library-cDNA Library and Gene bank- Brief account of: Antisense RNA technology; Gene Silencing; RNA interference; Microarray and Biosensors

Genomes-Genomes can be mapped both genetically and physically-Genome sequencing produces the ultimate physical map-DNA Sequencing method - Mapping and sequencing of human genome.-the human genome project. and plant genome project.

Module-2 Biotechnology- applications**12Hrs**

Biotechnology of Nitrogen Fixation Nitrogenases- structure and chemical properties-substrate and hydrogen –deuterium reactions-hydrogenases-hydrogen donating system.Nif Genes-Regulation of nif gene expression.Nod gene Expression-Transfer of nif gene to other organisms.-**Biotechnology of photosynthesis** -Chloroplast genome organization-Gene content and arrangement-regulation of gene expression.Regulation of gene expression in the nuclear coded gene and plastid gene-improvement of photosynthesis

Gene transfer technique for the improvement of agronomic characters

Pest Resistance-Herbicide Resistance-drought resistance-enrichment of storage protein (Mechanism of gene action)-Flower colour, Shape, fruit ripening, colour and flavour-Improvement of the nutritional quality of seeds-post harvest preservation.

Module-3 -Recombinant DNA technology and society**7 hrs**

Bioethnology and Bio ethics – an overview of Genetic screening for any predisposition symptoms, Gene therapy-DNA fingerprinting-GMOs, food safety- environmental concerns - Slow ripening fruits- controlled ripening .Cotton without insecticide-Biosafety issues and GMOs-Genetic screening and privacy-Role of multi national companies – Agribusiness-Golden Rice- (withvitamin-c) Terminator Genes. Economic, and Legal issues. Bio Ethics- Patenting Life forms- Biotechnology, Patents and the Third World.Biotechnology and the future of Agriculture-Stem cell research-sociopolitical issues- .HGP and ethical questions.

Module-4**Nano biotechnology****9Hrs**

Basics of Nanobiotechnology

Introduction- Background and definition of nanotechnology - nanosystems in nature- nano scaled bio molecules (nucleic acids and proteins) –chemical synthesis of artificial nanostructures.-Technologies for visualization of biological structures at the Nanoscale- Atomic force microscope- magnetic resonance force microscopy-Nanoscale scanning electron microscope- Nanoparticles- - Applications of nanotechnology in life sciences- Nano biotechnology and systems biology- nanobiology and the cell- biosensing of cellular responses.

Module-5**Plant Tissue culture –****6 Hours**

Culture media; composition, preparation and sterilization – Totipotency:definition and importance - Dedifferentiation and redifferentiation - Callus and suspension culture, meristem culture - Somaclonal variation - Somatic embryogenesis , Synthetic seeds -Anther culture and production of haploids - protoplast culture – somatic hybrids –cybrids

Practicals**18 hrs**

1. Isolation of DNA from plant tissues.
2. Production of callus
3. Visit to a well equipped biotechnology laboratory.
4. Preparation of plant tissue culture medium.
5. Demonstration of procedure of synthetic seeds

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KANNUR UNIVERSITY
B.Sc Botany Theory Model Question Paper

CORE- 14

**6B14BOT/PLS- BIOTECHNOLOGY, NANOBIO TECHNOLOGY AND PLANT
TISSUE CULTURE**

Time: 3 Hours

Total Weightage: 30

Section A

(Objective questions (Multiple choice /one word/sentence/ fill in the blanks /Match the following, true or false etc.) in cluster of four. Each cluster carries a weightage of 1

1. i) M13 is a
 - (a) Plasmid vector
 - (b) cosmid vector
 - (c) viral vector
 - (d) Phagemid vector
- ii). RFLP analysis is a technique that
 - (a). uses hybridization to detect specific DNA restriction fragments in genomic DNA
 - (b). is used to determine whether a gene is transcribed in specific cells
 - (c). is used to detect genetic variation at the protein level.
 - (d). is used to amplify genes for producing useful products
- iii) The technique of recombinant DNA was initiated in

a)1880s	b)1930s	c)1950s	d)1970s
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- .iv) . What is the function of restriction enzymes?
 - a) add new nucleotides to the growing strand of DNA
 - b) join nucleotides during replication
 - c) cut nucleic acids at specific sites
 - d) join nucleotides during transcription
- 2 i) Plasmid vectors for cloning
 - a) can generally accommodate larger inserts than phage vectors can.
 - b) grow within bacteria, and are present in bacterial colonies on an agar plate.
 - c) include centromeres to allow propagation in yeast.
 - d) burst bacteria and form plaques on a “lawn” of bacteria.
- ii) ‘Golden rice’ is nutritionally superior to normal rice due to
 - a)vitamin A
 - b)vitamin B
 - c)vitaminC
 - d)VitaminD
- iii) The “sticky ends” generated by restriction enzymes allow:
 - a) selection for plasmids lacking antibiotic resistance
 - b) easy identification of plasmids which carry an insert
 - c) replication of transfer RNA within the bacterial cell
 - d)pieces of DNA from different sources to hybridize to each other and to be joined together
- iv)Arabidopsis is advantageous for plant genetic research because:
 - a) it is a close relative of corn and results with this species can be applied to problems in corn

- b) it is an endangered species
 c) it is the closest to humans of any existing plant
 d) it is a small plant with a small genome size which can be raised inexpensively
4. State true or false
 i) Human Genome Project was very successful in determining the functions of over 80% of the genes located in 46 chromosomes
 ii) ϕ x174 has a double stranded RNA
 iii) Cybrids are synonymous to synthetic seeds
 iv) HEPA type of filter is located in Laminar air flow
5. Answer in one word or in one sentence
 i) An intercalating dye used to detect nucleic acid when viewed under uv light is-----
 ii) The expansion of PUC vector is-----
 iii) The function of Hup gene in rhizobium is-----
 iv) Name a cloning vector that can be used to clone large DNA fragments (> 1 MB)
6. Rearrange column B and C to match column A

i)	PBR322	Phage replacement vector	48.502kbp
		Phage insertion vector	
ii)	λ gt10	Green fluorescence	6kbp
		Ampicilin resistance	
iii)	pLFR5	Cohen and Boyer	2676bp
		Lac Zgene	
iv)	pUC8	phagemid	4362bp
		cosmid	

Section B

Differentiate the following: (Each question carries a weightage of 1)

- 6) PBR322 and PUC
 7) Nif gene and nod gene
 8) Micro injection and short gun
 9) cDNA library and DNA library.
 10) southern and western blotting
 11) Anther culture and protoplast culture

Section C

- (Short answer questions. Answer any five; each question carries a weightage of 1)
 12) What is the principle of blue-white selection for the presence of recombinant plasmids ?

- 13) What is a cDNA library ? List two advantages of a cDNA library over a genomic library.
- 14) What are single nucleotide polymorphisms ? With the help of any two examples explain the relevance of studying SNPs.
- 15) Why are Ti-plasmid based vectors disarmed ? Where is the gene of interest incorporated in this plasmid ?
- 16) What is a callus and how can callus cultures be maintained for prolonged periods? List two applications of callus cultures.
- 17) What is meant by the term "totipotent"? Are all plant cells totipotent?
- 18) What is the advantage of having a poly linker in a cloning vector

Section D

Short answer questions. Answer any six; each question carries a weightage of 2.

- 19) Enlist the six major steps in plant tissue culture. Name a medium commonly used for culturing plant parts and what factors dictate the choice of media ?
- 20.) (a) Why is *Agrobacterium tumefaciens* regarded as nature's genetic engineer?
(b) Describe vector-mediated and vector-less gene transfer in plants
- 21) Explain how adoption of biotechnological process in developed countries can cause economic hardships in developing countries
- 22) Give an account of the application of nanotechnology in life science.
- 23) What is the mechanism of gene action of the production of drought resistant plants?
- 24) What are type II restriction endonucleases (RE) ? Give an example of a type II RE that generates blunt ends and the sequence recognised by it. Explain how REs are named. Mention two other enzymes and their utility in cloning experiments.
- 25) Schematically depict the method of recombinant DNA technology and name two methods of introducing recombinant DNA into host cells
- 26) What is a DNA probe ? Explain the principle of Maxam and Gilbert's method of DNA sequencing.

Section E

Essay .(Each question carries a weightage of 4) Answer any one

- 27) Explain the genetics of nitrogen fixation. Give a brief account of regulation of nif gene expression.
- 28) What are the basic steps of a polymerase chain reaction (PCR) ? How can we selectively amplify a DNA fragment ? Write two applications of PCR.
- 29) Write an account on the biotechnology of photosynthesis

B.Sc. Botany/Plant Science**CORE- 15****ENVIRONMENTAL SCIENCE AND PHYTOGEOGRAPHY****Course Code: 6B15 BOT/PLS****No. of credits- 3****No. of contact hours- 54 + 18****Aim of the Course**

The dynamic nature of biosphere, interrelationships among individuals *etc.* can impart need for conservation in students.

Objectives:

- To enable the student to understand the fundamentals of environmental science
- To enable them to contribute meaningfully in the conservation of the environment.
- To make them aware of the current global problems of the environment due to human intervention and the need of developing a sustainable way of life
- To appreciate bio diversity and the importance of conservation strategies
- The need of research/database for the conservation and sustainable exploitation.
- To make them aware of the global ecological crisis.

Course Outline**Module-1-introduction****3Hrs**

Basic principles and concepts of ecology and environment-Interdisciplinary approach-Subdivisions and development of ecology - Scope and relevance to society and human environment. Need for public awareness.

Module-2 Ecosystem**6 Hrs**

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. 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; Sedimentary -Phosphorous, Calcium & Sulphur. Bio diversity promotes ecosystem stability.

Module 3-Ecological concept of species and community**8Hrs**

Autecological levels (genecology)- ecads, ecotypes, ecospecies-ecosystem level- ecological niche-spatial, trophic, multifactor or hypervolume niche- ecological equivalences- ecological indicators. Community Ecology :Community characteristics-Species diversity, dominance, co-existence, structure and interdependence - Clementsian units of vegetation- formation, association, consociation and society. Ecological Succession-. Hydrosere and Lithosere. Ecological adaptation of Hydrophytes, Xerophytes, Halophytes, epiphytes and parasites.

Module 4 - Natural resources**9 Hrs**

Renewable and non-renewable resources.Natural resources and associated problems.a) Forest resources- deforestation, afforestation, -conservation-protection forestry-chipko movement-production-commercial forestry -socialforestry, Agroforestry - timber extraction, mining, dams and their effects on forest and tribal people. b) Mineral resources- Environmental effects of extracting and using mineral resources. c) Water resources- use and over use of surface water and ground water- floods, droughts . d) Food

resources –World food problems, changes caused by agriculture, over grazing ,effects of modern agriculture ,fertilizer pesticide problems, water logging and salinity. e) Energy resources : Growing energy needs, renewable and non-renewable resources, use of alternate energy sources. f) Land resources : Land as a resource, land degradation , man- induced land slides, soil erosion and desertification. g) Equitable use of resources for sustainable life styles.

Module 5- Social issues and the environment

8 Hrs

Environmental pollution a) Definition, causes-effects and control measures. Types of pollution -Air, Water, Solid wastes-management-, radioactive, noise & thermal pollution. Remedial measures.- phytoremediation-environmental cleaning up by plants-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.

Module 6 - Human population and environment

6 Hrs

Population growth, variation among nations. Population explosion-Family welfare program. Environment and human health: Human rights. The Ecological crisis-industrialisation-the human transformation of the earth- human activity is placing the biosphere under increasing stress.growth of the world economy-.urbanisation.-the vulnerable planet.World Earth summits and protocols-Rio,Kyoto.Johannesberg.The failure of ecological reforms-Enviornmental revolution.

Module 7-Biodiversity and its Conservation

6 Hrs

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

Practical- 15 hrs

- 1) Visit a local polluted site and documentation of major pollutants/Reserve forest.
- 2) Study of plant community by quadrat method.
- 3) Observation and study of different ecosystems mentioned in the syllabus.
- 4) Study of ecological and anatomical modification of xerophyte, hydrophyte and parasites.
- 5) Estimation of DO and BOD
- 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)
- 7) Submit the report of polluted site/reserve forest.
- 8) Submit the report of quadrat method at five sites.

Module 8-Phytogeography

8hrs

Principles of phytogeography-Continental drift, age and area concepts, types of distribution-Continuous, discontinuous and endemic.-Theories of discontinuous distribution: Theory of land bridges.-Aims and methods of migration and dispersal.-Topographic factors-Altitude, latitude, direction of mountain ranges and valleys, -steepness of slope and exposure. GPS, Remote sensing.-Vegetation types of India.

Practical-**3hrs**

Preparation of map of India, to show distribution of vegetation types.

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Code:

Reg. No:

Name :

KANNUR UNIVERSITY EXAMINATION**Theory -Plant Science/Botany-Model Question Paper****CORE COURSE – 15****6B15 BOT/PLS- ENVIRONMENTAL SCIENCE AND PHYTOGEOGRAPHY****Time: 3 Hours****Total Weightage: 30***Draw diagrams wherever necessary***Section - A**Answer *All***(Questions in bunches of four; Each bunch carries a weightage of 1)****1. Choose the correct answer**

- i) A taxon facing high risk of extinction in the wild is identified as
 - a) endangered b) critically endangered c) vulnerable d) extinct
- ii) Kyoto protocol is related to
 - a) ozone layer depletion b) green house effect c) water pollution d) conservation of wild life
- iii) Global human population
 - a) 6 billion b) 3 billion c) 10 billion d) 5 billion
- iv) The disease which spread through water
 - a) typhoid b) tuberculosis c) Malaria d) AIDS

2. State true or false

- i) Mangrove plant is a halophyte.
- ii) National park is an example of *ex-situ* conservation.
- iii) Atmosphere is a source of resources.
- iv) Forest is a type of renewable resource.

3. Fill in the blanks

- i) Ecosystem with maximum primary productivity is
- ii) The two major vegetation types in India areand
- iii) Age and area theory was proposed by
- iv) The elimination oftype of species will seriously affect the ecosystem.

4. Rearrange column B and C to match column A

i)	Biodegradable pollutant	Cotton dust	Eutrophication
ii)	Secondary pollutant	D.D.T	Emphysema
iii)	Non degradable pollutant	Photochemical smog	Biomagnification
iv)	Particulate pollutant	Sewage	Byssinosis

5. Answer in one word or in one sentence

- i) World Environment Day.
- ii) Psammophyte
- iii) When and where the first earth summit was held?
- iv) Endemism

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. Habitat and niche
7. Saprophyte and parasite
8. Primary succession and secondary succession
9. Alpha diversity and beta diversity

10. Hydrologic cycle and sedimentary cycles
11. Biomagnification and bioaccumulation

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Give any two reasons for depletion of plant resources
13. Briefly explain the ecosystem services or indirect benefits provided by the ecosystems.
14. Enumerate the ill effects of acid rain.
15. In ecotypes variations are genetically fixed. Comment on this statement.
16. What is ozone depletion?
17. List out the reasons for the population explosion.
18. Comment on ecological niche.

Section D

Answer any *Six*

(Short essay- type questions; each question carries a weightage of 2)

19. Describe the various adaptations of Halophytes.
20. Mention any five forest types in India with examples.
21. Write short note on continental drift.
22. Give a short account on alternate energy resources.
23. What are the causes and remedies of radioactive pollution?
24. Give a short account of ecological indicators.
25. 'Chemical fertilizers and pesticide cause problems to environment'. Comment on this statement.
26. What are ecotypes? Describe the various types.

Section E

Answer any **One**

(Essay- type questions; Each question carries a weightage of 4)

27. What is sustainable development? Explain with reference to global environmental crisis.
28. Explain the causes, effects and effective control measures of water pollution.
29. Write an account of the phytogeographic regions of India.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany- B.Sc. Practical

CORE-16**Core Practical-II)**

**MICROBIOLOGY, MYCOLOGY, PHYCOLOGY, LICHENOLOGY, BRYOLOGY,
 PTERIDOLOGY, GYMNOSPERMS AND PLANT PATHOLOGY.**

Course code: 6B16BOT/PLS**Contact hours -69****Credit-4****Aim & Objectives**

1. To train the students in the use and maintenance of scientific equipments in biology.
2. To develop in them the scientific way of doing and making them understand that there are many models of experimentation that are possible.
3. To enable the students to identify the different organisms by morphological and anatomical studies.

Eligibility to appear for Core practical -2 (6B16BOT/PLS) External Examination

1. Certified Practical record

Course Outline**Microbiology- Practicals****(6 hrs)**

- 1) Micropreparation and identification of Nostoc.
- 2) Isolation and purification of Bacteria - Streak plate method.(Demonstration only)
- 3) Gram staining.
- 4) Isolation of Rhizobium from root nodules of leguminous Plants.
- 5) Study of motility by hanging drop method.
- 6) Identify TMV, HIV and Bacteriophages from the photographs.

Mycology Practical**(12 hrs)**

- 1) Make micro preparations of vegetative and reproductive structures of the following types:
 Pythium, Rhizopus, Saccharomyces, Aspergillus, Peziza, Puccinia, Agaricus, Cercospora
- 2) Make labelled sketches of the specimens observed

Phycology Practical**(16hrs)**

- 1) Make Micro preparation of vegetative and reproductive structures of the following types-
 Chlorophyceae - Chlorella, Volvox, Ulothrix, Cladophora, Zygnema, Oedogonium and Chara. Xanthophyceae – Vaucheria; Bacillariophyceae – Pinnularia; Phaeophyceae- Sargassum; Rhodophyceae- Polysiphonia
- 2) Make labelled sketches of Specimens observed

Lichenology Practical**(2 hrs)**

- 1) Make micropreparation of vegetative and reproductive parts of Usnea. Make sketches of the specimens observed.

Plant Diseases Practical**(3 hrs.)**

- 1) Identify the diseases mentioned in the syllabus with respect to causal organism and symptoms.
- 2) Students should be trained to prepare the fungicide Bordeaux mixture and Tobacco decoction.

Bryology, Practical-**(12 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.

Pteridology Practicals-**(12 Hrs)**

1. *Psilotum* : external features, stem T.S., synangium T.S
2. *Selaginella*: habit , rhizophore T.S, stem T.S ,axis with strobilus, Megasporophyll and Microsporophyll
3. *Equisetum* – Habit, rhizome T.S, stem T.S., strobilus V.S.
- 4 *Pteris*- Habit, petiole T.S., sporophyll T.S., prothallus
5. *Marsilea*- Habit, rhizome and petiole T.S, Sporocarp T.S, V.S & R.L.S.

Gymnosperms Practicals-**(12 Hrs)**

1. *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.
2. *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.
3. *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.

KANNUR UNIVERSITY EXAMINATION**Botany /Plant Science - B.Sc. Practical- Model Question Paper****(Core Practical-II)****6B16BOT/PLS -MICROBIOLOGY, MYCOLOGY, PHYCOLOGY, LICHENOLOGY, BRYOLOGY, PTERIDOLOGY, GYMNOSPERMS AND PLANT PATHOLOGY.****Time: 3 Hours****Max. Weightage= 30**

1. Make suitable micro preparations to bring out the structure of **i), ii), iii), iv)** and **v)**. Draw a cellular diagram of each and label the parts. Identify giving reasons and leave the preparation for valuation.

(Preparation-1, identification with reasons-1, labeled diagram-1) (Weightage- 3x5= 15)

2. Separate and identify any two algal specimens from the mixture **vi)**.

(Separation & preparation-0.5; identification with reasons-1)

(Weightage-1.5x2 = 3)

3. Perform the Gram staining of bacterial solution **vii)** and show the result. Write the procedure

(Procedure-1; Skill- 1; Result- 1)

(Weightage -3)

4. Identify the disease, name of pathogen and give important symptoms of **viii)**

(Disease-0.5; Pathogen-1; Symptoms-1.5)

(weightage-3)

5. Spot at sight **ix), x), xi), xii), xiii)** and **xiv)**

(weightage 1x6=6)

KEY TO THE SPECIMENS

- i)** Alga mentioned in the syllabus
- ii)** Fungus mentioned in the syllabus
- iii)** Bryophyte mentioned in the syllabus
- iv)** Pteridophyte mentioned in the syllabus
- v)** Gymnosperm mentioned in the syllabus
- vi)** Algal mixture(Mixture of different algae prescribed in the syllabus, containing at least four members)
- vii)** Bacterial solution
- viii)** Plant disease mentioned in the syllabus
- ix)** Alga
- x)** Fungus
- xi)** Lichen
- xii)** Bryophyte
- xiii)** Pteridophyte
- xiv)** Gymnosperm.

Scheme of questions

Quest. No.	Subject	Weightage
1	Phycology, Mycology, Bryology, Pteridology and Gymnosperm	15 (3 each)
2	Phycology	3
3	Microbiology	3
4	Plant Pathology	3
5	Phycology, Mycology, Lichenology, Bryology, Pteridology and Gymnosperm	6 (1 each)
	Total	30

KANNUR UNIVERSITY EXAMINATION**Plant Science/Botany- B.Sc. Practical****(Core Practical-III)**

ANGIOSPERM ANATOMY, ANGIOSPERM MORPHOLOGY, SYSTEMATICS, REPRODUCTIVE BOTANY, PLANT PHYSIOLOGY, UTILITY OF PLANTS, MEDICINAL BOTANY, ENVIRONMENTAL SCIENCE, BIOTECHNOLOGY AND MOLECULAR BIOLOGY

Course code: 6B17BOT/PLS

Contact hours – 162 Hrs

Credit-4

Aim & Objectives.

1. To train the students in the use and maintenance of scientific equipment in biology.
2. To develop in them the scientific way of doing and making them understand that there are many models of experimentation that are possible.
3. To enable the students for a comparison existing among different parts in different plants. and for identifying different plants by anatomical peculiarities
4. To enable the student to understand the fundamentals of environmental science

Eligibility to appear for Core Practical-III (6B17BOT/PLS)Examination

1. Certified Record
2. ,, Herbarium sheets and field book
3. ,, Tour /visit report
4. ,, Collections

Course Outline**Angiosperm Systematics****48 Hours**

1. Study of taxonomic features and *economic importance of representative members of the following families: Annonaceae, Nymphaeaceae, Capparidaceae, Malvaceae, Rutaceae, Anacardiaceae, Papilionaceae, Mimosaceae, Caesalpiniaceae, Myrtaceae, Cucurbitaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Asclepiadaceae, Convolvulaceae, Solanaceae, Scrophulariaceae, Acanthaceae, Lamiaceae, Amaranthaceae, Euphorbiaceae, 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 30 herbarium specimens representing all 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 for at least 7 days.

*economic importance - *Annona*, *Mangifera*, *Anacardium*, *Eucalyptus*, *Mimosa pudica*, *Saraca indica*, *Coccinia indica*, *Ferula asafoetida*, *Ixora*, *Cinchona*, *Eclipta alba*, *Vernonia*, *Gymnema*, *solanum torvum*, *Scoparia dulcis*, *Coleus aromaticus*, *Amaranthus viridis*, *Ricinus communis*, *Allium cepa*, *Allium sativum*, *Cocos*, *Oryza*.

Angiosperm Morphology**6 Hours**

1. Leaf submission as an album to study the diversity in leaf shape, tip, base, margin and venation
2. Identify with a note the different types of inflorescence, fruits and placentations.
3. Submission of preserved materials of various inflorescences of racemose, cymose and mixed/special types.

Angiosperm Anatomy**26 hrs**

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

Reproductive Botany - Practicals**(10 hrs)**

1. Identify C.S of Anther; Dicot embryo, Monocot embryo and eight nucleated embryo sac.
2. Study of the different stages of anther development.
3. Pollen germination test.
4. To dissect and display early stages of embryo development- *Tridax*/ *Crotalaria*.

Plant Physiology Practicals**(18Hrs)**

13. Determination of water potential by tissue weight change method
14. Water potential of onion peel/Rheo peel by plasmolytic method
15. Effect of temperature on permeability
16. Papaya petiole osmoscope/simple osmoscope/potato tuber osmoscope
17. Determination of stomatal index
18. Comparison of rate of transpiration by the upper and lower surface of the leaf by cobalt chloride method
19. Relationship between water absorption and transpiration
20. Determination of the rate of transpiration using Ganongs potometer
21. Effect of scarification on seed germination
22. Photomorphogenesis in seedlings grown under normal light and darkness

23. Testing of seed viability by tri phenyl tetrazolium chloride..
24. Determination of gravitropism using clinostat

Plant Biotechnology

18 hrs

1. Isolation of DNA from plant tissues.
2. Production of callus
3. visit to a well equipped biotechnology laboratory.
- 4.

Environmental Science and Phytogeography

15 hrs

1. Visit a local polluted site and documentation of major pollutants/Reserve forest.
2. Study of plant community by quadrat method.
3. Observation and study of different ecosystems mentioned in the syllabus.
4. Study of ecological and anatomical modification of xerophyte, hydrophyte and parasites.
5. Estimation of DO and BOD
6. Knowledge of ecological instruments-hygrometer,rain gauge, anemometer, altimeter,luxmeter, wet and dry bulb thermometer, salinometer, water sampler, GPS(with thehelp of equipment/digram or photograph)
7. Submit the report of polluted site/reserve forest.
8. Submit the report of quadrat method at five sites.

Phytogeography

Practical:

3hrs

Preparation of map of India, to show distribution of vegetation types.

KANNUR UNIVERSITY EXAMINATION**Plant Science/Botany- B.Sc. Practical- Model Question Paper****BOTANY (Core Practical-III)****Course Code: 6B17BOT/PLS****Angiosperm Anatomy, Angiosperm Morphology, Systematics, Reproductive Botany, Plant Physiology, Environmental Science, Biotechnology and Molecular Biology****Time: 3 Hours****Max. Weightage= 30**

1. Take a T.S. of material **i**) 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- 1; labeled diagrams- 1; identification 0.5; reasons 1.5) (Weightage-4)
2. Take a T.S. of material **ii**) and identify the ecological group and comment on its adaptations
(Ecological group-0.5; adaptations-1) (weightage-1.5)
3. Describe the given specimen **iii**) in technical terms. Classify the specimen to its respective family giving reasons. Give a floral diagram and floral formula Draw labelled diagram of the L.S. of flower
(Technical description of Vegetative Characters- 0.5; Technical description of Floral Character- 1; Identification of the family- 0.5 ;Reasons- 0. 5; Floral Formula- 0.5; Floral diagram - 0.5; Labelled diagram of L.S of the flower-0.5) (Weightage- 4)
4. Identify, classify and describe the vegetative and floral characters of specimen **iv**) giving reasons (weightage 2)
5. Dissect out the embryo of **v**) and mount; draw a labeled diagram and identify the stage, giving reasons.
(Preparation-1; labeled diagram-0.5; identification-0.5; reasons-0.5) (Weightage-2.5)
6. Calculate the abundance, density and frequency of each species in the given quadrat table **vi**) (Abundance-1; Density-1; Frequency-1) (weightage-3)
7. Write the anatomical features of the specimen **vii**). (Weightage-1)
8. Identify and write notes on **viii**) (weightage -1)
9. Give the binomial and family of **ix**), **x**), **xi**) and **xii**)
(Binomial-0.5; Family-0.5) (Weightage-1x4=4)
10. Give the binomial, family and exact morphology of useful part of **xiii**) (weightage-2)
(Binomial-1, Family-0.5, Morphology-0.5)
11. Set up the physiology experiment using the materials supplied **xiv**) and explain its principle and working
(Explanation-1; Experimental Set up- 1) (weightage2)
12. Calculate the stomatal index of the given leaf **xv**) (weightage 2)
12. Spot at sight **xvi**) and **xvii**) (weightage 0.5x2=1)

KEY TO THE SPECIMENS

- i)** Anatomy- stem or root as per the syllabus
- ii)** Any Ecology specimen mentioned in the syllabus
- iii)** Plant/ twig with large flowers and buds from any dicot families as per syllabus
- iv)** Plant/ twig with flowers from any family (not necessarily from the syllabus)
- v)** *Tridax/Crotalaria* fruit

- vi) Quadrat Table consisting of 3 species
- vii) Any anatomy material as per syllabus
- viii) Fruit/ inflorescence/ Leaf type/ Placentation
- ix) Campus plant belonging to the family
- x) Campus plant belonging to the family
- xi) Herbarium specimen
- xii) Herbarium specimen
- xiii) Type mentioned in the Angiosperm systematics syllabus
- xiv) Physiology experiment
- xv) Leaf
- xvi) Instruments
- xvii) (Environmental science/ Biotechnology/ Molecular Biology)

Scheme of questions

Quest.No.	Subject	Weightage
1	Angiosperm Anatomy	4
2	Environmental Science	1.5
3	Systematics	4
4	Systematics	2
5	Reproductive Botany	2.5
6	Environmental Science	3
7	Angiosperm Anatomy	1
8	Angiosperm Morphology	1
9	Angiosperm Systematics	4 (2 each)
10	Angiosperm Systematics	2
11	Plant Physiology	2
12	Plant Physiology	2
13	Environmental Science/Biotechnology / Molecular Biology	1 (0.5each)
	Total	30

CORE– 18**PROJECT WORK/FIELD VISIT/STUDY TOUR****Course Code: 6B18 BOT/PLS****No. of credits- 2****No. of contact hours-****Aim**

To practice the skills/theoretical knowledge acquired during the programme to find out and experience the method of science.

Objectives of the Course

1. Project work will kindle the spirit of research and invention among the students and will expose them to the realities outside their classrooms. It will impart sufficient academic and practical experience and motivate them to become self employed in the particular field.
2. To have an acquaintance with scientific report writing, data analysis *etc.*
3. Field visit/ Study tour provides an opportunity to appreciate the environment, ecology and biodiversity aspects of plants. The dynamic nature of biosphere, interrelationships among individuals *etc.* can impart need for conservation in students.

Course Outline**Project Work:**

Each student must submit a duly certified report of a project work carried out by him related to the elective paper or any topic related to Botany at the end of the sixth semester. Topic of the project shall be given during the earlier semesters, so that projects could be done during the semester-breaks. The students may be grouped into different batches assigning projects of different topics. Try to maintain individual differences in the data and the preparation of dissertation; even if students do the same project work as a group under the guidance of a teacher. The involvement of the students in the project may be also considered for the evaluation of the dissertation, since there is an internal examiner for the evaluation of the project.

The project report may be certified by the supervising teacher and the Head of the Department.

Viva-voce: The students are required to appear for a viva-voce during the practical examination of the sixth semester. Viva-voce will be based on the research methodology and the content of the project.

Field Visit Field trip to learn the plant diversity and characteristics of plant families under the supervision of teachers for at least 7 days.

Submission: Submission of herbarium / collection of plants from different groups/permanent slides/Tour/Visit Report

PROJECT EVALUATION /FIELD VISIT /SUBMISION**Course Code: 6B18 BOT/PLS****No. of credits- 2****Internal Evaluation** **Total weightage 10**

- | | |
|--|-------------|
| 1 Presentation of the project(seminar) with discussion and open questions . | weightage 5 |
| 2 study tour /field visit | weightage 2 |
| 3 Submission of herbarium / collection of plants from different groups /permanent slides | weightage 3 |

External Evaluation **Total weightage 30**

- | | |
|---|--------------|
| 1 Project Dissertation | weightage 20 |
| 2 project presentation by the student | weightage 3 |
| 3 Viva voce on the basis of project and related subject | weightage 7 |

ELECTIVE COURSE

(6B19 BOT/PLS)

1. **Utility of Plants and Medicinal Botany**
2. **Plantation Botany**
3. **Nursery Management and Mushroom Cultivation**
4. **Ethnobotany**
5. **Pharmacognosy**
6. **Seed Technology**

B.Sc. Botany/Plant Science**ELECTIVE COURSE- 1.UTILITY OF PLANTS AND MEDICINAL BOTANY****Course Code: 6B19 BOT/PLS (i)****No. of credits- 2****No. of contact hours- 36****Aim of the Course**

To enable the proper description, identification, naming and classification of higher plants- angiosperms- to conserve.

Objectives:

- 1 This study enriches the systematic Botany which can be utilized for botanical diagnosis of fragmentary crude drugs.
2. This study will be useful in identifying medicinal taxa.
3. This study also helps in knowing the preliminary phytochemistry of plant organs

Course Outline**Module 1- Utility Of Plants****18 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, Horse gram, Pigeon pea, Cow pea, Soya bean, Green peas.

Fruits & Vegetables- Banana, Jackfruit, Pineapple, citrus, Apple, Cashew, Watermelon, Tomato, Brinjal, Common bean, Sword bean, Pumpkin, Cucumber, Snake gourd, Bitter gourd, Ash gourd, Bottle gourd.

Spices and condiments- Cinnamon, Clove, Cardamom, All-spice, Star-anise, Coriander, Cumin, Fennel, Nutmeg, Pepper, ginger, Tamarind

Sugar-yielding plants- sugarcane, Sweet potato, sugar beet.

Fibre yielding – Cotton, Coir, Jute

Dyes - Indigo, Henna

Latex yielding - Para rubber

Tuber crops - Tapioca, Yam, Carrot, Potato, Colocasia.

Oil yielding - Sesame oil, Palm oil, mustard oil, Coconut oil.

Beverages- Tea, Coffee, Cocoa.

Practical-

1. Study of the raw materials or direct products, mentioned in the syllabus.
2. Collection & submission of Economic Botany materials, representing atleast one from each group.

Module 2- Medicinal Botany**18 hrs**

1. Ethnomedicine: Scope, interdisciplinary nature, Outlines of Ayurveda, Sidda, Unani and Homeopathic systems of traditional medicine. Role of AYUSH, NMPB, CIMAP, CDRI and CMPR Kottakkal
2. Plants in primary health care: Common medicinal plants – *Tinospora cordifolia*, *Ocimum*, *Acorus*, *Adhatoda*, *Sida*, *Turmeric*, *Leucas*, *Aloe*.
3. 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: *Aswagandha* (*Withania somnifera*), *Sarpagandha* (*Rauvolfia serpentina*), *Phyllanthus amarus*, *Amla* (*Phyllanthus emblica*) *Asoka* (*Saraca indica*) and *Brahmi* (*Bacopa monnieri*)
4. Pharmacognosy- Introduction and scope, Adulteration of plant crude drugs and methods of identification - some examples; Indian Pharmacopoeia
Sources of crude drugs-roots, rhizome, bulb, corm, leaves, bark and wood, resins and gums, bud and flowers, fruits and seeds.

Practicals

1. Local field visits to and study the vegetation and flora to acquire knowledge to identify them on the spot.
2. Morphological study of medicinally important part(s) of locally available plants- minimum ten plants used in traditional medicine.
3. Field visit to collect and identify ethnomedicinal plants used by local tribes.
4. Raise at least five medicinal plants in the campus and submit a report.

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 ethnobotany. Oxford and IBH New Delhi.
3. Jain S K 1990. Contribution Indian ethnobotany. Scientific publishers Jodhpur
4. Jain S K.1996. Ethnobotany in human welfare. Deep publishers. New Delhi
5. Jyothi prakash E J 2006. Medicinal botany and pharmacognosy. Emkay Publishers New Delhi
6. Maheshwary J K2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific publishers
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 Books, New Delhi.

B.Sc. Botany/Plant Science**ELECTIVE COURSE -2.PLANTATION BOTANY****Course Code: 6B19 BOT/PLS (ii)****No. of credits- 2****No. of contact hours- 36****Aim and Objectives of the Course**

- 1.To enable proper understanding of different types of Plantation Crops.
- 2.To orient the students regarding crop propagation methods and agronomic practices.

Course Outline**Module-1 plantation crops and their importance 6 Hrs**

Importance of Plantation Crops in the economy of India

Present status of plantation crops in Kerala

Study of the plantation crops mentioned below in relation to importance, origin, distribution, morphology, taxonomy, floral biology, morphology and biochemistry of the useful parts-Tea, Coffee, Rubber, Coconut, Arecanut and Cashew.

Module-2 crop propagation 6Hrs

A detailed study of crop propagation and importance of the above crops with special reference to :-

- a) improved methods of propagation- budding, grafting, layering
- b) in vivo and in vitro methods of rapid multiplication
- c) nursery practices-production of planting materials
- d) plant introduction and selection techniques

Module-3 cultivation 6Hrs

A detailed study of the agronomic practices of the crops mentioned with special reference to:-

- a) soil and climate
- b) land preparation and planting techniques
- c) organic manure- green manure, compost, farmyard manure
- d) micro and macronutrients- management of fertilizers
- e) chemical fertilizers-nitrogen, potassium and phosphorus
- f) growth regulators- natural, synthetic

Module-4 Diseases and their management 6Hrs

Study of the symptoms, etiology, crop loss and management of the major pests and diseases of the crops mentioned earlier

Traditional disease management strategies-Major plant protectants-fungicides, bactericides, pesticides and herbicides-Biological control of pests and diseases- integrated pest and disease management.

Module-5 Harvesting and processing**6Hrs**

Study of the harvesting, storage, processing and marketing of the economically important products of the crops mentioned earlier

Practicals**6Hrs**

1. Collection, identification and submission of the herbarium specimens of the crops mentioned, in the syllabus.
2. Field observations on the floral biology of the crops
3. Practice special techniques of propagation- budding, grafting and layering.
4. Study and identification of improved varieties of crops mentioned in the syllabus.
5. Visit to plantations to study harvesting and processing techniques of major crops (field visit under the supervision of teachers).

References

1. Bavappa KVA, Nair MK and Kumar TP(1982), The Arecanut Palm, CPRI.
2. CCRI (1985), Coffee Guide, Coffee Board R&D Chikmangalore.
3. Child R(1974) Coconuts(Edn. 2) Longman
4. Chopra, VL and Peter, KV(2005), Handbook of Industrial crops, Routledge.
5. Narayanan PK, 1976, Rubber and its cultivation, Rubber Board
6. Parthasarathy V.A., P.K. Chattopadhyay and T.K. Bose. 2006, (eds.) Plantation Crops, Vol. 2., Naya Udyog, Kolkata
7. Rajan, S and Markose BL, (2007), Horticulture series, Vol.6, Propagation of Horticultural Crops, New India Pub., New Delhi.

B.Sc. Botany/Plant Science**ELECTIVE COURSE-3.NURSERY MANAGEMENT AND MUSHROOM CULTIVATION****Course Code:** 6B19 BOT/PLS (iii)**No. of credits-** 2**No. of contact hours-** 36**Course Outline****Module-1-Nursery Management****12 Hrs**

Introduction and scope- Layout of Nurseries- importance of nursery- propagation structures and soil mixtures-soil preparation-soil treatment-garden tools and implements-preparation of nursery beds-organic manure and fertilisers-irrigation methods-preplanting treatments-maintenance of nursery—transplantation and aftercare

Module-2 Plant Growing Structures -**4Hrs**

Plant growing structures-advantages of growing in green houses, Hotbeds, cold frames

Module-3 Media for propagation**- 4 Hrs**

Characteristics of media-common media for propagation-soil, sand, peat, sphagnum moss, vermiculite, soil mixture and preparation of nursery beds

Module -4 Mushroom cultivation**4Hrs**

Introduction- nutritional value of mushrooms-edible mushrooms and poisonous mushrooms

Module-5 Mushroom cultivation- Proceure**6Hrs**

Building and layout-composting-peak healing-spawn and spawning-crop management-picking-grading and packing-cultivation of white button mushroom(*Agaricus bisporus*) and Paddy straw mushroom(*Pleurotus spp.*)

Practicals**6Hrs**

- 1.Preparation of potting mixture of known combination and potting in earthen pots or polythene bags
- 2.Preparation of compost/wormicompost using different substrates
- 3.Plant propagation techniques-budding, layering, grafting
- 4.Preparation of Bordeaux mixture
- 5.Visit to a well established nursery
- 6.Practical methods of mushroom culture

References

- 1.Goplaswamy Iyengar, KS, Complete Gardening in India,4th edn.

2. Harander Singh(1991), Mushrooms- The art of Cultivation, Sterling Publishers Pvt. Ltd., New Delhi.
3. Harold Davison, Roy Mecklenburg and Curtis Peterson(2009) Nursery Management 4th Edition, Culinary and Hospitality Industry Publications Services.
4. IMGA, Indian Journal of Mushrooms, Mushroom Research Laboratory, College of Agriculture, Solan.
5. IMGA, Mushroom Cultivation in India-Special Prized Bulletin, IMGA College of Agriculture, Solan.
6. Kumar, N.(1994) Introduction to Horticulture, Rajalakshmi Publications, Nagercoil.
7. Manibhushan Rao, K (1991) Text Book of Horticulture, Macmillan, India, Ltd.
8. Nita Bahl(1995), Handbook on Mushrooms 3rd Edn. Oxford and IBH Publishing Co., New Delhi.
9. Peter Mc Hoy(1984), Garden Planning and design, Blandford Press, UK.
10. Ram, RC,(2007) Mushrooms and their cultivation Techniques, Aavishkar Pub.,Jaipur.

B.Sc. Botany/Plant Science**ELECTIVE COURSE - 4. ETHNOBOTANY****Course Code: 6B19 BOT/PLS(iv)****No. of credits- 2****No. of contact hours- 36****Course Outline**

MODULE 1- (6hrs)
Ethnobotany- Introduction, definition, scope and categories of ethnobotany, significance direct relationship of plants with ethnic groups. Importance of morphological characters and physical properties in ethnobotanical study.

MODULE 2 (4hrs)
Linkage of ethnobotany with other sciences and disciplines. Anthropology, History, and Agriculture.

MODULE 3 (5hrs)
Linkage of ethnobotany with food and nutrition, medicine, sociology and culture, religion and social customs.

MODULE 4 (10hrs)
Ethnic agricultural practices-shifting cultivation, cultivation of slopes, seed preservation, control measures for the protection of seeds- various traditional practices of rice cultivation followed by ethnic groups and medicinal uses of rice.

MODULE 5 (8hrs)
Sacred groves – various names attributed to sacred groves in native language-socioreligious belief-sacred groves and their role in the preservation of gene pool-Important plant ecosystems preserved in Kerala by religious beliefs.

MODULE 6 (3hrs)
Umbrella stones- Historical background – location of umbrella stones in Kerala ethnobotanical interest of umbrella stones.

PRACTICALS

1. Visit to 3 sacred groves nearby and study the area covered and the type of plants (collection of plants not expected)
2. Visit to Umbrella stones of Central Kerala.
3. Submit the detailed report of 1 and 2 to illustrate the ethnobotanical interests of sacred groves and Umbrella stones.
4. Collection of some important medicinal plants on folklore information and preparation of herbarium (minimum 10 sps.)
5. Ethnobotanical field work in the locality. Identification and study of 15 plants of ethnobotanical interests (Taxonomic descriptions and chemical contents of the plants are not expected) Submit the herbarium

REFERENCES

1. Dey, A.C. 1998 **Indian Medicinal Plants and Ayurvedic Preparations**-Bishen Singh – Mahendrapal Singh, Dehra Dun.
2. Jain, S.K **Contribution to Indian Ethnobotany**-Periodical experts, Book agency.
3. Jain, S.K –**Dictionary of Indian Folk medicine and Ethnobotany**.Deep Pub.
4. Jain, S.K **Manual of Ethnobotany** –Scientific pub.-Jodhpur

5. Jain, S.K. (ed) 1981 **Glimpses of Indian Ethnobotany**-Oxford IBH.
6. Krishna Iyer, L. 1987. **The Travancore Tribes and Castes**-Govt. press TVM
7. Luiz, A.D. 1962. **Tribes of Kerala**-Bharatiya Adimjathi Sevak sangh, New Delhi.
8. Manilal, K.S. 1990. **Linkage of Ethnobotany with other sciences and disciplines**, Ethnobotany, 1(1). 14-23..
9. Manilal, K.S. (ed) 1980. **Botany and History of Hortus Malabaricus**-Oxford-IBH.
10. Ramachandran, S.P. 1991, **Recent advances in medicinal, aromatic and spice crops**. Today and tomorrow publications, New Delhi
11. Sivarajan, V.V. Balachandran, **Ayurvedic medicines and their Plant sources**.
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B.Sc. Botany/Plant Science**ELECTIVE COURSE- 5.PHARMACOGNOSY****Course Code: 6B19 BOT/PLS (v)****No. of credits- 2****No. of contact hours- 36****Course Outline**

Module1- Introduction – meaning and scope of Pharmacognosy - relation to allied fields of study systematic scheme of pharmacognosic study.

(5hrs)

Module2- Historical development of pharmacognosy – centres of origin –Diversity of medicinal plants-Introduction to Ashtanga hridaya- Classification of endemic and exotic plants – General account of medicinal plants used in ayurveda.

(5hrs)

Module3- System of classification of drug from natural resources- alphabetical classification- Taxonomical classification –Morphological classification –Pharmacological classification – Chemical classification.

(5hrs)

Module 4 -Cultivation and collection of crude drugs-cultivation method –soil type- method of extraction of crude drugs.

(5hrs)

Module5- Source of crude drugs-Root, rhizome, tuber, bulb, corm, leaves, stem, flower, fruits and seeds-sources of tannin and dyes.

(4hrs)

Module 6- Detailed study of the following plants for their pharmaceutical products-(the study include habit, habitat and systematics of plants mentioned-organoleptic, anatomical, chemical evolution of useful part-Phytochemistry and pharmacological action of the drug- Major Ayurvedic preparation and formulations using raw drug)

Achyranthus aspera ,Adhatoda vasica, Allium cepa, Allium sativum ,Aloe barbedens, Datura alba, Ferula asafetida, Gloriosa superba , Phyllanthus amara,Strychnos mixvomica, Scoparia dulcis, Zingiber officinale, Vetiveria sizanoides.

(10hrs)

Module7-Secondary products- alkaloids, turpenol, phenolics- properties, classification and function- Pharmacological uses.

(2hrs)

PRACTICAL

1 Familiarise with atleast 5 folk medicines and report the source cultivation and extraction.

2 Identification of the medicinal plants listed in the syllabus.

3 Visit to Ayurveda college or Arya vaidya sala.

REFERENCE

1. Anonymous. **Indian medical plants** (5vol.),Arya vaidya sala, Kottakkal.
2. Arumugham, K.R. and Maragesh,N. **Text book of Pharmacognosy**, Sathya Publishers, Chennai.
3. Atal, C.K. and Kapur ,B.M.1982), **Cultivation and utilization of aromatic plants**.
4. Bose,K,C. **Pharmacopea indica** ,Bishen singh Mahendrapal Sigh,Dehradun.
5. Gokhalae,S.B. **Text book of Pharmacognosy** , Jai Publishing Co. New Delhi.
6. Kirthikar and Basu **Indian medical plants** (4vol.)International Book distributors. Dehradun.
7. Wallis,T.E, **Text book of Pharmacognosy**

B.Sc. Botany/Plant Science

ELECTIVE COURSE-6. SEED TECHNOLOGY

Course Code: 6B19 BOT/PLS(vi)

No. of credits- 2

No. of contact hours- 36

Aim and objectives of the Course

1. This study helps to have a thorough knowledge of the seed structure and different types of seeds.
2. It improves the knowledge of students about storing seeds, seed testing, methods of breaking dormancy and seed certification.

Course Outline

Module-1

Seed-formation and development-environmental effects-seed structure-seed coat-embryo-food storage structures-storage reserves-seed classification

Module-2

Seed Germination-general features-morphology and physiology of germination-requirements for germination- seedlings different types

Module-3

seed dormancy-purpose-definition- types -factors affecting dormancy-methods of breaking dormancy-seed burial-seed bank

Module-4

Seed industry-seed handling-Seeds and other methods of propagation –seeds for propagation in agriculture-national and international criteria- Seed longevity-factors affecting-seed storage-cryopreservation-seed storage structures and containers-preparation for marketing-seed viability, vigour, health and moisture content-seed testing-seed certification-legislation-quarantine-methods to improve crop varieties-somatic embryogenesis and organogenesis

Module-5

Seeds and their use by man-agriculture-food-feed-raw material in industry

Practicals

1. Determination of seed moisture content
2. Study the seed viability by tetrazolium chloride test
3. Study the germination percentage of various seeds
4. Break the dormancy of seeds by using different scarification methods

Reference

1. Baskin, CC and Baskin, JM(2001). Seeds: Ecology, Biogeography and Evolution of Dormancy and Germination, Academic Press, San Diego.
2. Bedell, PE. (1998) Seed Science and Technology: Indian Forestry Species.Allied Publishers Limited, New Delhi.
3. Bewley, JD and Black M(1994) Seeds: Physiology of Development and Germination.2nd edn. Plenum Press, New York.
4. Mayer, AM and Poljakoff-Mayber, A(1989) The Germination of Seeds 4th edn. Pergamon Press, England.

KANNUR UNIVERSITY

*COURSE STRUCTURE
&
SYLLABUS*

BOTANY
(Complementary)

UNDER

CHOICE BASED CREDIT SEMESTER SYSTEM

EFFECTIVE FROM 2009 ADMISSION

Scheme Botany (Complementary)

No.	Semester	Course Code	Title of the Course	hours/week	Credits
1	I	1C01BOT	Diversity of Life – Different Categories- Microbes, Fungi and Lichens- and Evolution of Plants	2+2	2
2	II	2C02BOT	Plant Diversity- Algae, Bryophyta, Pteridophyta, Gymnosperms and Angiosperm –Reproductive Botany	2+2	2
3	III	3C03BOT	Angiosperms–Morphological variations, systematics, Utility of plants and Plant pathology.	3+2	2
4	IV	4C04BOT	Plant physiology, Angiosperm anatomy and crop improvement	3+2	2
5	IV	4C05BOT	Complementary Botany practical -microbes, fungi, lichens, plant diversity, Angiosperm morphology, systematics, anatomy, pathology, physiology and crop improvement	*	4

COMPLEMENTARY – 1
DIVERSITY OF LIFE-DIFFERENT CATEGORIES- MICROBES, FUNGI AND
LICHENS - AND EVOLUTION OF PLANTS

Course Code- 1C01BOT

No. of credits- 2

No. of contact hours- 36+ 36

Aim of the Course

To get an idea of the diversity existing among lower forms of life.

Objectives:

- 1.To have a general understanding about the diverse groups of organisms
- 2.To understand the nature and evolution of life
- 3.To enable the students to identify the different microorganisms by microscopic studies.
- 4.To get a comparative account of organisms with an evolutionary link

Course Outline

Module-1- Systematics and Phylogenies

5hours

Biologists name organisms in a systematic way- classification of organisms-species names-taxonomy-taxonomic hierarchy - Phylogenies and evolutionary relationship-convergent evolution-cladistics-systematics and classification .

Categories of living organisms

Major categories of living organisms-kingdoms of life-six kingdoms of life by Carl Woese-3domains 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

10 hours

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 Fungi and Lichen

9 hours

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

Module-4 Evolution , plant diversification and paleobotany

12hrs

Origin and evolution of plant- an overview -Early plant life – The first autotrophs- The evolution of true plant cells-the green algae.-origin and evolution of land vascular plants- Evolution of the first seed plants-Gymnosperms. Angiosperms - the culmination of plant evolution.

Objectives of Palaeo botany – Geological time scale- Fossil formation - a brief account only. Fossil plants -Bryophytes, Pteridophytes, Gymnosperms and Angiosperms.

Practicals

(36Hours)

Examine, draw, and identify the following specimens assigning reasons

1. Gram Staining (Demonstration only)
2. Identify TMV, Bacteriophages from the photographs.

3. Nostoc- colony, trichome enlarged
4. Rhizopus asexual and sexual.
5. Puccinia –Teleuto-, Uredo-, Pycnial- and Aecidial sori VS.
6. Usnea thallus with apothecium, Apothecium V.S.

Palaeo Botany

Identify with reasons: *Rhynia* and *Lepidodendron*.

References

1. Aggarwal, S. K. (2009), Foundation Course in Biology, Ane Books Pvt. Ltd., New Delhi
2. Alexopoulos C J, Mims C. and Blackwell, M. (1996), Introductory Mycology, JohnWiley.
3. Andrews H.N. (1967) - *Studies on Palaeobotany* – C .J . Felix
4. Arnold C . A (1947) - *Introduction to Palaeobotany* - McGraw Hill Co. New Delhi.
5. Delevoryas, Theodore-PlantDiversification(2nd Edn),Halt,rinehart and winston
6. Dube H C, An Introduction to fungi - Vikas publishing House, New Delhi.
7. Dubey R C and D K Maheswary : A Text Book of Microbiology : S Chand and Co NewDelhi,
8. Gunasekaran G, Lab Manual of Microbiologist, New Age Publication.
9. Harlan.P.Banks(1972) Evolution and plants of the past,Macmillan
10. Heritage, J ; Evans, E.G.V; Killington, R.A. (1996) Introductory Microbiology Cambridge University Press.
11. Jacquelyn G. Black(2008), *Microbiology: Principles and Explorations*, John Wiley and Sons, Inc. USA.
12. Jay.M.Savage (1963) Evolution .Halt,rinehart and Winston
13. Mamatha Rao, Microbes and Non flowering plants-impacts and applications, Ane Books, Pvt Ltd New Delhi
14. Pandey & Trivedi - A text book of Fungi, Bacteria and Virus Vikas Publishing House, New Delhi.
15. Pandey B. P. (1976), College Botany Vol. I , S. Chand and Company Ltd., New Delhi.
16. Pandey, B. P. 2001.*College Botany, Vol. I: Algae, Fungi, Lichens, Bacteria, Viruses, Plant Pathology, Industrial Microbiology and Bryophyta*. S. Chand & Company Ltd, New Delhi.
17. Prithipalsingh(2007), An introduction to Biodiversity- Ane Books India, New Delhi
18. Raven, P.H; Johnson, G.B; Losos, J.B; Singer, S.R (2005), *Biology, seventh edition*, Tata McGraw-Hill, New Delhi
19. Robert A Wallace. Biology, The world of life. Harper Collins Publishers.
20. Sharma Kanika, Manual of Microbiology, Ane Books India, New Delhi (2007).
21. Sharma O.P, Text Book of fungi, Tata– McGraw Hill Publishing Company Limited, New Delhi
22. Sharma P D : The fungi, Rastogi Publication Meerut
23. Sharma, P. D., Microbiology - Rastogi Publication, Meerut
24. Smith G.M Cryptagamic Botany Vol 11Mc Graw Hill Co. New Delhi.
25. Stebins G.L(1950) Variation andEvolution in plants.Columbia universty.press.Newyork
26. Strwart W.N (1983) paleobotany and Evolution of plants-Cambridge university press
27. Thakur Anil K, Bassi Susheel K, Diversty of microbes and Cryptogams. S. Chand and Company, New Delhi

Code:

Reg. No:

Name :

KANNUR UNIVERSITY EXAMINATION**Complementary Botany I-Model Question Paper****1C01BOT- DIVERSITY OF LIFE-DIFFERENT CATEGORIES-MICROBES, FUNGI AND LICHENS and EVOLUTION OF PLANTS****Time: 3 Hours****Total Weightage: 30***Draw diagrams wherever necessary***Section - A**Answer *All***(Questions in bunches of four; Each bunch carries a weightage of 1)****1. Choose the correct answer**

- i) Non motile spore in fungi
 a) aplanospore b) zoospore c) hyphospore d) endospore
- ii) In bacteriophage head is made of
 a) enzyme coat b) protein coat c) lipid coat d) carbohydrate
- iii) Which one is not true of prokaryotic cells?
 a) multicellular b) no nucleus c) circular DNA d) flagella
- iv) Coal is an example for-----type of fossil.
 a) Compression b) Impression c) Amber d) Petrification

2. Write true or false

- i) A lichen is a highly integrated mutualistic association between two different fungi.
 ii) Life cycle of puccinia consists of six types of spores.
 iii) Angiosperms originated during cretaceous period
 iv) Stellar organization in Rhynia is a simple protostele.

3. Fill in the blanks

- i) Lichens growing on bark is called-----
 ii) A branch of Botany which deals with the study of fungi is called-----
 iii) Viruses which infect plants are called-----
 iv) Lepidodendron appeared as a tree with -----root system.

4. Match the following

A	B
i) Coenozoic	Mosses
ii) Mesozoic	Algae
iii) Palaeozoic	Gymnosperms
iv) Precambrian	Angiosperms

5. Answer in one word

- i) Taxonomic hierarchy
 ii) Fruiting body of lichens
 iii) -----type of fossils give internal details of plant organs.
 iv) Father of Indian paleobotany.

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. Systematics and Taxonomy
 7. Lepidophyllum and Lepidostrobus
 8. Akinete and Heterocyst
 9. Prokaryotes and Eucaryotes

10. Plasmogamy and Karyogamy
11. Coacervates and Protocells

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Vegetative methods of reproduction in fungi.
13. What is lichen? Write the names of its fructification.
14. What are the basic adaptations of plants to dry land?
15. What would have been the essential features of first land plants? How far does Rhynia fit into your conception?
16. Draw a labeled diagram of structure of Bacteriophage.
17. Explain asexual reproduction on Nostoc.
18. What is nomenclature? Explain binomial, trinomial and polynomial nomenclature

Section D

Answer any *Six*

(Short essay- type questions; each question carries a weightage of 2)

19. Gymnosperms and angiosperms are successful in populating many environments compared to lower plants. Why?
20. With the help of diagram explain the stem anatomy of Rhynia.
21. Classify fungi according to Ainsworth (1973).
22. Viruses are considered as the bridge between living and non living things. Substantiate the statement.
23. Many of the prokaryotes are economically very important. Discuss the statement.
24. What is a fossil? Explain briefly the process of fossilization.
25. Write the different taxonomic categories of plants in the hierarchical order with suitable examples.
26. 'Mitochondria and chloroplasts are thought to have arisen by engulfing aerobic and photosynthetic bacteria' Comment.

Section E

Answer any *One*

(Essay- type questions; Each question carries a weightage of 4)

27. What is Puccinia Rust disease? Write two host plants of this disease. Explain one stage from each host plant.
28. With the help of labeled sketch describe the structure and life cycle of bacteria.
29. Explain two kingdom, three kingdom, five kingdom and six kingdom classification of living organisms.

COMPLEMENTARY COURSE – 2
PLANT DIVERSITY - ALGAE, BRYOPHYTA, PTERIDOPHYTA, GYMNOSPERMS
AND ANGIOSPERM- REPRODUCTIVE BOTANY

Code- 2C02BOT

Contact Hours = 36+ 36) (2 Hours per week)

Module -1 - Algae (12hrs)

Algae- General account and Classification.

Chlorophyceae - Structure and life history of the following types-*Volvox*,*Spirogyra*

Xanthophyceae-General Characters ,*Vaucheria*, Structure, Reproduction.

Phaeophyceae-General Account *Sargassum*, Structure, Reproduction

Rhodophyceae -General characters *Batrachospermum*, structure, reproduction

Module-2 Bryophyta (5hrs).

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

Module -3Pteridophyta (5hrs)

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

Module -4 Gymnosperms (5hrs)

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

Module 5 Angiosperms

Reproductive Botany (9hrs)

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.

PRACTICALS (36Hours)

Students must be able to:

Make, examine, draw, and identify micro preparations of the following specimens.

They should be able to identify the reproductive stages also assigning reasons.

PLANT DIVERSITY.

- 1) *Volvox*, colony with daughter colony, showing zygote
- 2) *Spirogyra*, single filament, single cell scalariform and lateral conjugations.
- 3 *Sargassum*, thallus, stipe T.S, male and female receptacle.
- 4) *Batrachospermum* thallus
- 5) *Rhizopus* asexual. and sexual.
- 6) *Puccinia* -Teleuto Uredo, Pycnial and Aecidial

- 7) *Riccia* habit, thallus T.S. Thallus T.s. with antheridia and archegonia
8j) *Riccia* thallus with sporogonium V.S.
9) *Selaginella*, habit, stem T.S., strobilus V.S.
10) *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.

ANGIOSPERM REPRODUCTIVE BOTANY

Identify: T.S of mature anther, dicot and monocot embryo.

REFERENCES

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- 2.Kumar. H.D& Singh A.N - A text book on Algae. Chand & Company.
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COMPLEMENTARY COURSE – 3
ANGIOSPERMS – MORPHOLOGICAL VARIATIONS, SYSTEMATICS, UTILITY
OF PLANTS AND PLANT PATHOLOGY

Course Code: 3C03 BOT

No. of credits- 3

No. of contact hours- 54+ 36

Aim of the Course

To enable the proper description, identification, naming and classification of higher plants- angiosperms- to conserve.

Objectives:

1. To observe the variations among plants, especially angiosperms.
2. To understand the way of description of a plant.
3. To study the floral characters with an aim to identify the taxa authentically.
5. To study the various types of floral distribution in Northern Kerala
6. To apply all these data into various other fields.
7. This study will be useful in identifying medicinal and other economically important taxa.

Course outline:

Module 1: Angiosperm Morphological variation of flower

8Hours

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

Module 2 : Angiosperm Systematics

30 Hours

Objectives & importance of taxonomy. Brief history of angiosperm classification. Artificial, natural and phylogenetic. 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, Papilionaceae, Rutaceae, Apiaceae, Rubiaceae, Asteraceae, Apocynaceae, Solanaceae, Lamiaceae, Euphorbiaceae, Orchidaceae, and Poaceae.

Module 3 : Utility Of Plants

10hrs

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 *Rauwolfia*.

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.

PRACTICALS - 36 Hours:**(2 Hours per week)****Angiosperm Morphology**

No practical - 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, Draw labeled diagrams of the flower V.S., construct floral diagrams and floral formula and describe using technical terms.

Identify; write the binomial and family of the herbarium specimens submitted by the students. At the time of practical examination students have to submit laboratory record, herbarium and field book for verification.

Utility Of Plants

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

Plant Pathology

Identify the plant diseases mentioned in the syllabus

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COMPLEMENTARY COURSE – 4
PLANT PHYSIOLOGY, ANGIOSPERM ANATOMY AND CROP IMPROVEMENT

Course Code: 4C04BOT

No. of credits- 3

No. of contact hours- 54+ 36

Aim of the Course

To understand the functioning of plant molecules, plant cells and plant body

Objectives

- To understand the physical principles which is needed to explain the mechanism of plant living and growth
- To enable the students in understanding the function of plants with respect to its environment and structure.
- To develop appreciation in the wonderful mechanism of transport system exists in plants.
- To create research interest and observation skill by introducing the way by which plant physiology researches were carried out..

Module I:

12 Hrs

Plant Physiology -Plant Water Relations and Mineral Nutrition

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 II:

12Hrs

Photosynthesis

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 III: Plant Growth & Regulation**5hrs**

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

Module IV Angiosperm Anatomy**18 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, Monocot stem-*Dracaena*

Ecological Anatomy-Anatomical adaptations of the following ecological groups-

Xerophytes, Hydrophytes, Epiphytes, Parasite and Halophytes.

Microtechnique-Killing and Fixation, dehydration, staining, mounting, maceration, sectioning.

Module V Crop Improvement**7Hours**

Plant introduction and acclimatization.-Plant breeding - Objectives and methods.

Brief account of mass selection, pure line selection and clonal selection.

Mutation breeding, polyploidy breeding and hybridization. Plant tissue culture-methods-Micro
propagation-synthetic seeds

PRACTICALS - 36 Hours: (2 Hours per week)**Students must be able to:**

Make, examine, draw, and identify micro preparations of plant diversity specimens.

Identify the reproductive stages of the above specimens assigning reasons.

Angiosperm Anatomy

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

Prepare stained transverse sections, draw cellular diagrams and identify the following:

Primary structure of dicot stem- *Centella*, *Eupatorium* and *Cephalandra*.

Monocot stem-Bamboo and Grass.

Primary structure of dicot root -*Menianthus* and Pea; Monocot root-*Colocasia*, *Rhoeo*

Dicot stem- secondary - *Vernonia* and *Tinospora*,

Dicot root secondary- *Ficus*, *Tinospora* and *Ricinus*.

Dicot leaf-*Ixora*; Monocot leaf-Grass.-Anomalous secondary growth:Dicot stem –
Boerhaavia, Monocot stem -*Dracaena*.

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

Crop Improvement

Demonstrate grafting, budding and layering.

Demonstrate the technique of emasculation in *Crotalaria*.

REFERENCES

1. Chaudhari K. (1984) Elementary principles of plant breeding. Oxford and IBH publishing Company
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COMPLEMENTARY-5**BOTANY COMPLEMENTARY PRACTICAL COURSE****Course Code: 4C05BOT****No. of credits- 4****No. of contact hours- 8****DIVERSITY OF LIFE-DIFFERENT CATEGORIES- MICROBES, FUNGI AND LICHENS - AND EVOLUTION OF PLANTS****Practicals****(36Hours)****Examine, draw, and identify the following specimens assigning reasons**

1. Gram Staining (Demonstration only)
2. Identify TMV, Bacteriophages from the photographs.
3. Nostoc- colony, trichome enlarged
4. Rhizopus asexual and sexual.
5. Puccinia –Teleuto-, Uredo-, Pycnial- and Aecidial sori VS.
6. Usnea thallus with apothecium, Apothecium V.S.

Palaeo Botany

Identify with reasons:

1. *Rhynia*
2. *Lepidodendron*

PLANT DIVERSITY - ALGAE, BRYOPHYTA, PTERIDOPHYTA, GYMNOSPERMS AND ANGIOSPERM- REPRODUCTIVE BOTANY**PRACTICALS****(36Hours)****Students must be able to:****Make, examine, draw, and identify micro preparations of the following specimens.****And identify the reproductive stages assigning reasons.****PLANT DIVERSITY.**

- 1) *Volvox*, colony with daughter colony, showing zygote
- 2) *Spirogyra*, single filament, single cell scalariform and lateral conjugations.
- 3) *Sargassum*, thallus, stipe T.S, male and female receptacle.
- 4) *Batrachospermum* thallus
- 5) *Rhizopus* asexual. and sexual.
- 6) *Puccinia* -Teleuto Uredo, Pycnial and Aecidial
- 7) *Riccia* habit, thallus T.S. Thallus T.s. with antheridia and archegonia
- 8j) *Riccia* thallus with sporogonium V.S.
- 9) *Selaginella*, habit, stem T.S., strobilus V.S.
- 10) *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.

ANGIOSPERM EMBRYOLOGY

Identify:

1. T.S of mature anther,
2. Dicot embryo
3. Monocot embryo.

ANGIOSPERMS – MORPHOLOGICAL VARIATIONS, SYSTEMATICS, UTILITY OF PLANTS AND PLANT PATHOLOGY**Practicals - 36 Hours:****(2 Hours per week)****Angiosperm Morphology**

No practical - 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,
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.

Utility of Plants

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

Plant Pathology

Identify the plant diseases mentioned in the syllabus

PLANT PHYSIOLOGY, ANGIOSPERM ANATOMY AND CROP IMPROVEMENT

Practicals -

36 Hours: (2 Hours per week)

. 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*, *Eupatorium* and *Cephalandra*.
 - b) Monocot stem-Bamboo and Grass.
 - c) Primary structure of dicot root -*Menianthus* and Pea; Monocot root-*Colocasia*, *Rhoeo*
 - d) Dicot leaf-*Ixora*; Monocot leaf-Grass ,
 - e) Dicot stem- secondary - *Vernonia* and *Tinospora*
 - f). Dicot root secondary- *Ficus*, *Tinospora* and *Ricinus*.
 - g) Anomalous secondary growth:Dicot stem – *Boerhaavia*, Monocot stem -*Dracaena*.

Crop Improvement

1. Demonstrate grafting, budding and layering.
2. Demonstrate the technique of emasculation in *Crotalaria*.

KANNUR UNIVERSITY EXAMINATION**Botany- B.Sc. Practical- Model Question Paper****Course Code: 4C05BOT****BOTANY (COMPLEMENTARY COURSE)**

Time: 3 Hours

Max. weightage= 30

- I Take a T.S. of material i) 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) (weightage-5)
- II Refer the specimen ii) to its respective family. Give the systematic position. Point out the important characters of identification.
Identification- 0.5, systematic position- 0.5, reasons -2. (weightage-3)
- III Take the V.S of the flower iii), Leave the preparation for valuation. Draw the V.S. of the flower. Construct the floral diagram and write the floral formula.
V.S -0.5, diagram- 0.5, floral diagram- 0.5 and floral formula- 0.5. (weightage-2)
- IV Make the micro preparations of iv) & v). 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 weightage)
- V Identify specimens vi) & vii) with reasons.
Identification -0.5, reason- 1 (1.5 x 2 = 3 weightage)
- VI Identify the disease viii) Name the pathogen. Write the important symptoms.
Disease- 0.5 pathogen -0.5, symptoms -1. (weightage-2)
- VII With a labeled diagram explain the working of the experiment ix) Mention the aim.
Aim- 0.5, labeled diagram -1, working -1.5. (weightage-3)
- VIII Identify the specimen x) giving important reasons.
Identification -0.5, reason- 1. (weightage- 1.5)
- IX Spot at sight xi), xii) & xiii). (0.5x3= 1.5 weightage)
- X Write the botanical name and family of the given specimens xiv) & xv).
Binomial -0.5, family- 0.5. (1 x 2 = 2 weightage)
- XI Give the binomial and family of the given herbarium sheet xvi)
Binomial -0.5, family -0.5 (weightage-1)

SPECIMEN KEY

- I. Anatomy of monocot stem, dicot stem and root – primary and secondary- Dicot stem and root, Anomalous growth as *Boerhaavia* stem. Mentioned in the syllabus (i).
- II. Families mentioned in the syllabus(ii)- Avoid monocot families.
- III. Flowers with buds as mentioned in the syllabus (iii) - Avoid monocot families.
- IV. Thallophyta (iv) and Bryophyta/Pteridophyta (v)
- V. Embryology –vi; Anatomy -vii.
- VI. Specimens from pathology mentioned in the syllabus -viii.
- VII. Physiology experiment as mentioned in the syllabus-ix
- VIII. Specimen from Palaeo Botany mentioned in the syllabus-x
- IX. Thallophyta, Bryophyte & Pteridophyta.(xi, xii) - Gymnosperm.- (xiii)
- X. Specimens – xiv& xv mentioned in the syllabus - direct products only.
- XI. Herbarium sheet -xvi

Sd/-

Dr.Kochuthresiamma Andrews
Chairperson, Board of studies, Botany (UG)

Open Courses (Botany)

(Any of the six courses can be opted during the fifth and sixth semesters, keeping in mind that no courses are repeated during the sixth semester, according to which the course code may be

5D01BOT/PLS

OR

6D02BOT/PLS)

Scheme Open Courses

No.	Semester	Course code	Title of the Course	Hour/ week	Credits
1	V	5D01BOT/PLS	1.Horticulture	2	2
			2.Mushroom cultivaton and marketing		
			3.Environmental Science		
2	VI	6D02BOT/PLS	4.Medicinal plants	2	2
			5.Forestry		
			6.Biotechnology		

1.HORTICULTURE

COURSE CODE: 5D01BOT/PLS OR 6D02BOT/PLS

Contact Hours: 36

Credit-2

Module I

10 Hrs

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 pseudo bulbs.

Media for propagation of nursery plants- characteristics of media- common media for propagation- soil, sand, peat, sphagnum moss, vermiculite. Soil mixture and nursery beds.

Manures: Organic and inorganic; Irrigation methods.

Module II

8 Hrs

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 III

10 Hrs

Olericulture- Definition- Importance of vegetables- Production technology- Cultivation, harvesting and storage of vegetables- Bhindi, Brijal, Bitter gourd, Snakegourd, Cucumber, Pumpkin, Colocasia, Tapioca and Tomato.

Pomology- Definition and Importance-Cultivation, harvesting and storage of fruits- Banana, Pineapple and mango. Sapota, apple, orange & jackfruit. Growth regulators in horticulture. Plant protection measures for horticultural crops.

Module IV

6 Hrs

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

Cultivation of plantation crops- Cardamom, Coffee, Tea, Coconut Arecanut, Rubber and Cashew.

Module V

2 Hrs

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

PRACTICALS

1. Demonstration of vegetative methods of propagation
2. Flower arrangement with cut flowers.
3. Preparation of potting mixture of known combination
4. Visit to a well established nursery.

REFERENCES

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KANNUR UNIVERSITY EXAMINATION
Botany Model Question Paper

Reg. No:

Code:

Name :

Open Course

Course Code: 5D01BOT/PLS OR 6D02BOT/PLS **1. HORTICULTURE**

Time: 3 Hours

Total Weightage: 30

Section - A

Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The process of breaking dormancy of seed by cracking is called as
(Scarification, stratification, sterilization, none of these)
- ii) The development of embryo through asexual reproduction is called as
(Apospory, apogamy, Apomixis, none of these)
- iii)----- are called the primary nutrients in plants
(Mn Zn K, NPK, Ca Mg K, None of these)
- iv) The branch of horticulture, which deals with the cultivation of fruits, is
(Pomology, Olericulture, palynology, floriculture)

2. Fill in the blanks

- i) A natural green carpet of garden in called-----
- ii) The branch of horticulture, which deals with the cultivation of trees, is called-----
- iii) Covering of an area, preferably a bed or a series of beds with dense, low growing herbaceous plants, creating some letters is called-----
- iv) A step like configuration of the field along the contour, by half cutting and half filling, to minimize soil erosion is called as-----

3. True or false

- i) Mycorrhizae are beneficial fungi that grow in a plant, symbiotic relationship on the root
- ii) Growing of two or more vegetable crops in the same field at the same time is called mixed cropping
- iii) Removal of moisture under controlled conditions of temperature, humidity and flow of air is called scarification
- iv) Post harvested treatment given to vegetables for fast healing of mechanical injury, lowering the moisture contact and reducing the rotting of fungal growth is called curing

4. Match the following

- i) Snake gourd - *Momordica charantia*
- ii) Bitter gourd - *Lycopersicon esculentum*
- iii) Ladies finger - *Trycosanthes anguina*
- iv) Tomato - *Abelmoschus esculentus*

5. Answer in one word or in one sentence

- i) Mulching
- ii) Vermiculite
- iii) Water garden
- iv) Peat

Section B

Answer any four of the following: (Each question carries a weightage of 1)

Differentiate between

6. Rockery and Topiary
7. Olericulture and floriculture
8. Hedges and edges
9. Centering and tipping
10. Irrigation and fertigation
11. Hot bed and cold frame

Section C

(Short answer questions. Answer any five; each question carries weightage of 1)

12. Why orchids are not propagated by seeds?
13. What is the significance of glass houses in Horticulture?
14. What may be done to increase the storage of some cut flowers?
15. During rooting periods of bulbs and corms, soil should be low in nitrates- explain.
16. What are suckers? How suckering can be promoted?
17. Write a critical note on drip irrigation.
18. Briefly describe the method of potting orchid plants.

Section D

Short answer questions. Answer any six; each question carries a weightage of 2.

19. What are the parameters to be taken care during the harvesting of flowers?
20. Give a brief description of different methods of pruning and its significance in trees.
21. Write briefly on the cultivation methods used in Anthurium. Give the name of two commonly cultivated varieties.
22. Describe at least three different types of layerage and indicate their special applications.
23. Describe the principal practices of a production unit in a nursery.
24. Describe the common garden tools and implements.
25. Give an account of various plant protection measures for horticultural crops.
26. Write briefly on the cultivation methods used in Tomato, Bhindi and Brinjal.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Describe the various steps to grow Bonsai.
28. How can a good lawn be prepared?
29. Give an account of the different types of growth regulators and their uses in Horticulture.

2. MUSHROOM CULTIVATION AND MARKETING

Course code -5D01BOT/PLS OR 6D02BOT/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 term 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: 5D01BOT/PLS OR 6D02BOT/PLS

No. of credits- 2

No. of contact hours- 36

Aim of the Course:

The dynamic nature of biosphere, interrelationships among individuals etc. can impart need for conservation in students.

Objectives:

1. To enable the students to understand the fundamentals of environmental science
2. To enable them to contribute meaningfully in the conservation of the environment.
3. To make them aware of the current global problems of the environment due to human intervention and the need of developing a sustainable way of life
4. To appreciate bio diversity and the importance of conservation strategies.
5. To make them aware of the global ecological crisis.

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

8hrs

Natural resources-Renewable and non-renewable resources.Natural resources and associated problems.- Forest resources- deforestation, afforestation, -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-industrialisation-the human transformation of the earth- human activity is placing the biosphere under increasing stress.growth of the world economy-.urbanisation.-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 . – Environmental 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.
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5. Clark R .S .Marine Pollution – Oxford
6. Jadhav H. Environmental Protection laws – Himalaya Pub:
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11. Kumaresan B. – Plant Ecology & Phytogeography – Rastrogi Pub:
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14. Mishra. D. D. 2008. Fundamental Concepts in Environmental Studies. S. Chand & Company Ltd.,New Delhi.
15. Odum – Fundamentals of Ecology – Prentice Hall

16. Odum, E. P. 1983. Basics of Ecology. Saunder's International Students Edition, Philadelphia.
17. Rao M .N . & Dutta A .K . Waste Water Management – Oxford &IBH
18. Rao,M., 2009. Microbes and Non-flowering plants- impact and applications, Ane Books, Pvt. Ltd., New Delhi.
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20. Sharma P . D . Ecology and Environment – Rastroggi Pub:
21. Sharma, P. D. 1989. Elements of Ecology. Rastogi Publications, Meerut.
22. Singh, H. R. 2005. Environmental Biology. S. Chand & Company Ltd., New Delhi.
23. Trivedi R .K . – Hand book of Environmental laws – Enviro Media.
24. Trivedi R .K . Introduction to Air Pollution – Tecno- Science Pub:
25. Verma V. – Text book of Plant Ecology – Emkay Pub:
26. Verma, P. S. and V. K. Agrawal. 2004. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology. S. Chand & Company Ltd., New Delhi.
27. Wagner K. D . – Environmental management – W. B .Saunders Co:

4.MEDICINAL PLANTS

Course code- 5D01BOT/PLS OR 6D02BOT/PLS

Contact Hours- 36

Credit - 2

Module I

Ethnobotany- definition- categories-major tribes of south India- regional studies- ethnomedicinal plants- wild food plants- socio-economic status. 8 Hours

Module II

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

6 Hours

Module III

Pharmacognosy – definition and scope – ancient and modern science (*sidha, ayurveda unani and homeopathy*), Classification of vegetable drugs, identification of drugs (taxonomical, anatomical, and chemical). 8 Hours

Module IV

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*. 8 Hours

Module V

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. 6 Hours

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

9. Anil K Dhiman.2003. Sacred Plants and their medicinal uses. Daya publishing house New Delhi.
10. Jain S K 1981. Glimpses of Indian ethnobotany. Oxford and IBH New Delhi.
11. Jain S K 1990. Contribution Indian ethnobotany. Scientific publishers Jodhpur
12. Jain S K.1996. Ethnobotany in human welfare. Deep publishers. New Delhi
13. Jyothi prakash E J 2006. Medicinal botany and pharmacognosy. Emkay Publishers New Delhi
14. Maheshwary J K2000. Ethnobotany and medicinal plants of Indian subcontinent. Scientific publishers
15. Singh G K and Anil Bhandari 2000. Textbook of Pharmacognosy. CBS publishers N.Delhi.
16. Verma V 2009. Text book of Economic Botany. Ane Book

5.FORESTRY

Course Code- 5D01BOT/PLS OR 6D02BOT/PLS

Contact Hours- 36

Credit - 2

Module I

General introduction to forests- Natural and Man made; Tropical, temperate, evergreen semi-evergreen, deciduous; Monoculture, multipurpose, social and industrial.

Forest and gene conservation. 5 Hours

Module II

Silviculture- concept and scope of study of natural and artificial regeneration of forests. Clear felling, uniform shelter, wood selection, coppice and conservation systems. Silviculture of some of the economically important species in India such as *Azadirachta indica*, *Tectona grandis*, *Eucalyptus*, Mahagoni *Dalbergia sisso* and *Santalum album*, jack wood, Rubber.

8 Hours

Wood: Homogenous and heterogenous- spring and autumn wood- Porous and non porous wood- Heart and sap wood. 2Hours

Relevance of wood anatomical studies in Kerala- Identification of wood- preparation of key and their uses 3 Hours

Module III

Social and agro forestry. Selection of species and role of multipurpose trees. Food, fodder and energy. Social forest- Avenue plantation. Sacred plants- definition, importance of sacred trees like *Ficus religiosa*, *Embllica officinalis*, *Aegle marmelous*. 5 Hours

Module IV

Seed orchards, seed dormancy- Types of dormancy, physical and chemical methods to overcome seed dormancy. Forest laws- necessity, General principles, Indian forest act 1927 and their amendment. 5 Hours

Module V

Forest resources and utilization. Forest products- timber, pulp wood, secondary timbers, non timber forest products (NTFPs). Definition and scope (brief outline) - Gums, resins, fibers, oil seeds, nuts, rubber, canes and bamboos, medicinal plants, charcoal. Lac collection and marketing. 8 Hours

PRACTICALS

1. Identification of wood using key: Teak, Jack wood, Mahogany, Rubber, Azadirachta, Eucalyptus.
2. Visit to a plywood factory to have knowledge of wood based industry.

REFERENCES

1. Anil Kumar Dhiman. 2003. Sacred plants and their medicinal uses. Daya publishing house, New Delhi.
2. Anonymous, A Hand book of Kerala Timbers- KFRI, Trichur.
3. Chundawat B.S. and S.K.Gautham. 1996. Text book of Agroforestry. Oxford and IBH Publishing house, New Delhi.

4. Kollmann and Cote 1988. Wood science and Technology. Vol.I & II Springer verlag.
5. Sagreiya, K.P. 1994. Forests and Forestry (Revised by S.S. Negi). National book trust. New Delhi.
6. Sharma P.D. 2004. Ecology and Environment. Rastogi publications, Meerut
7. Singh M.P. and Vinita Vishwakarma. 1997. Forest environment and Biodiversity. Daya publishing house, New Delhi.
8. Tiwari K.M. 1983. Social forestry in India.
9. Tribhawan Mehta, 1981. A handbook of forest utilization. Periodical Expert Book Agency, New Delhi.

6. BIOTECHNOLOGY

Course Code: 5D01BOT/PLS OR 6D02BOT/PLS

No. of credits- 2

No. of contact hours- 36

Aim and objectives

1. To know the fundamental techniques of biotechnology. and the history of its development.
2. To orient them to apply the technology in agriculture and other fields.
- 3 To make them aware of the economic,. social and environmental problems of gene manipulation
- 4 To acquaint and train them in the use of the equipments in biotechnology
- 5 To understand the application of bio technology and nanobiotechnology.

Module-1 -Recombinant DNA Technology-

(15Hrs)

Recombinant DNA and Molecular cloning-Restriction Endonucleases-Ligases and other DNA modifying Enzymes(cutting,modifying and joining DNAmolecules)

Cloning vectors-Plasmids-Bacteriophages-PBR322,PUC, λ phage- Ti and Ri Plasmids

Construction of recombinant DNA-methods - Vector method.Agrobacterium mediated gene transfer-Direct DNA uptake-Electroporation-shot gun method-microinjection

Strategies of molecular cloning - Screening ,selection and analysisof recombinants, Molecular probes- Colony Hybridisation-insitu hybridization-southern.northern western blotting-RFLP-RAPD, -FISH- DNAand RNA Fingerprinting-Genomic Library-cDNA Library and Gene bank-DNA Sequencing method-Mapping and sequencing of human genome.-the human genome project and plant genome project.

Module-2- Recombinant DNA technology and society

(7 hrs)

Bioechnology and Bio ethics – an overview of Genetic screening . Gene therapy-DNA fingerprinting,(Paternity and Forensics), GMOs, food safety- environmental concerns

GMOs-Genetic screening and privacy-Role of multi national companies – Agribusiness-Golden Rice- Terminator Genes. Economic, and Legal issues. Bio Ethics-Patenting Life forms . Biotechnology,Patents and the Third World. Stem cell research-sociopolitical issues. .HGP and ethical questions.

Module-3-Nano biotechnology

(9Hrs)

Basics of Nanobiotechnology-Introduction- Background and definition of nanotechnology - nanosystems in nature- nano scaled bio molecules (nucleic acids and proteins) –chemical synthesis of artificial nanostructures-Technologies for visualization of biological structures at the Nanoscale- Atomic force microscope- magnetic resonance force microscopy-Nanoscale scanning electron microscope- Nanoparticles- - Applications of nanotechnology in life sciences- Nano biotechnology and systems biology- nanobiology and the cell- biosensing of cellular responses.

Module-4 -Plant Tissue culture –**5 Hours**

Culture media; composition, preparation and sterilization – Totipotency: definition and importance . Synthetic seeds -Anther culture and production of haploids - protoplast culture – somatic hybrids –cybrids

References:

1. Balasubramanian, D et.al(1996) (Ed):*Concepts in Biotechnology*; Costed IBN Universities press.
2. Benjamin Lewin(2004) *Gene VIII*.Pearson Education international.
3. Bharat Bhushan (Ed.) (2004),*Handbook of Nanotechnology* Springer-Verlag, Berlin.
4. Chawla.H.S(2003) *Laboratory Manual for plant Biotechnology*;oxzford and IBH
5. Colin Ratledge, Bjorn Kristian Sen, (eds.) 2006, *Basic Biotechnology*, 3rd edn. Cambridge University Press, New Delhi.
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8. Desmond S.T.Nicholl(2004) : *An introduction to Genetic Engineering*.
9. Dieter Hess;(1975):*Plant physiology*: Springer international Student Edition.
10. Donald Voet,Judith.G. Voet and Charlotte W.Pratt(2006) :*Fundamentals of Biochemistry*, 2nd edn.:John Wiley and Sons ,Inc.
11. Dubey, R.C (2001): *A text book of Biotechnology*.
12. Enzo Russo and David Cove(1998): *Genetic Engineering , Dreams and Nightmares*;oxford university press.
13. Himanshu Arora(2007), *Ane's Illustrated Dictionary of Biotechnology*, Ane Books India, New Delhi.
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15. Jain.K.K () *Nanobiotechnology in molecular diagnosis- current technologies and applications*.
16. Jan Vijg, 2007, *Aging of the genome- The dual role of DNA in life and Death*, Oxford University Press Inc.,
17. John .E.Smith(2004):*Biotechnology*:Cambridge university press.
18. Karp, G.(2008) *Cell and Molecular Biology: Concepts and Experiments*, John Wiley and Sons (Asia) Pte Ltd.
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21. Laura Livingston Mays(1981):*Genetics A Molecular approach*: Macmillan publishing company.
22. Lehninger, Y.L. Nelson, D.L and Cex, M.M.(1993); *Principles of Biochemistry*;CBS Publishers and Distributors.
23. Mary A.Schulerand Raymond E.Zielinski(2005): *Methods in plant molecular Biology*;Academic press.
24. Purohit and Mathur(1996) *Biotechnology :Fundamentals and Applications*. Agro Botanical Publishers-India.

25. Sandhya Mitra(1988) *Elements of Molecular Biology* ;Macmillan.
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29. Twyman, R.M (1998), *Advanced Molecular Biology* Viva Books Private Ltd.
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Sd/-

**Dr.Kochuthresiamma Andrews,
Chairperson,BOS Botany(UG)**

KANNUR UNIVERSITY**(Abstract)**

B.Sc Botany/Plant Science Programmes under CCSS-Common Pattern of Question Paper for Core/Complementary/General/Open Courses and Model Question Paper for II Semester Botany Complementary Course-Implemented with effect from 2009 admission-Orders issued.

ACADEMIC BRANCH

U.O No.Acad/C2/2471/2007

Dated, K.U Campus P.O,08-04-2010.

Read: 1. U.O No Acad/C2/2471/2007(1) dated 08-07-2009.

2. Letter dated 20-02-2010 from the Chairperson, Board of Studies in Botany (UG).

ORDER

1)The Scheme and Syllabus of B.Sc Botany/ Plant Science Programmes (Core/ Complementary/General/Open Courses were implemented in this University under Choice Based Credit Semester System with effect from 2009 admission, vide paper read(1) above.

2) The Chairperson, Board of Studies in Botany (UG),vide paper read (2), has forwarded the Common Pattern of Question Paper applicable for all Core/Complementary/General/Open Courses and Model Question Paper for II Semester Complementary (Botany) Course for implementation with effect from 2009 admission under Choice based Credit Semester System.

3) 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 Common Pattern of Question Paper applicable for all Core/Complementary/General/Open Courses and Model Question Paper for II Semester Examinations of Complementary (Botany) Course of B.Sc Botany/Plant Science Programmes under CCSS,with effect from 2009 admission***,subject to report to the Academic Council.

4) The University Order read (1) stands modified to this extent.

5) The implemented Pattern of Question Paper and the Model Question Paper for II Semester Complementary (Botany) Course effective from 2009 admission are appended.

6) Orders are issued accordingly.

Sd/-
REGISTRAR

To:

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

Copy To:

1. The Chairperson, BOS in Botany (UG)
2. PS to VC/PA to PVC/PA to Regr
3. DR/AR I Academic 4. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER

Appendix to U.O No Acad/ C2/2471/2007 dated 08-04-2010.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany-Theory Model Question Paper

Code:

Reg. No:

Name :

CODE-----GENERAL/CORE/COMPLEMENTARY/OPEN/ELECTIVE COURSES

Time: 3 Hours

Total Weightage: 30

Section - AAnswer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) a) ----- b) ----- c) ----- d) -----
 ii) a) -----b) ----- c) ----- d) -----
 iii) a) -----b) ----- c) ----- d) -----
 iv) a) -----b) ----- c) ----- d) -----

2. State true or false

- i)
 ii)
 iii)
 iv)

3. Fill in the blanks

- i).....
 ii).....
 iii)
 iv)

4 Match the following.

i)		
ii)		
iii)		
iv)		

5. Answer in one word or in one sentence

- i)
 ii).....
 iii).....
 iv).....

Section -BAnswer any *Four***Differentiate the following: Each question carries a weightage of 1)**

6. Differentiate
 7. Differentiate
 8. Differentiate

9. Differentiate
10. Differentiate
11. Differentiate

Section C

Answer any *five*

(Short answer questions; each question carries a weightage of 1)

12. short answer question
13. short answer question
14. short answer question
15. short answer question
16. short answer question
17. short answer question
18. short answer question

Section D

Answer any *Six*

(Short essay- type questions; each question carries a weightage of 2)

19. short answer question
20. short answer question
21. short answer question
22. short answer question
23. short answer question
24. short answer question
25. short answer question
26. short answer question

Section E

Answer any **One**

(Essay- type questions; Each question carries a weightage of 4)

27. Long essay type question
28. Long essay type question
29. Long essay type question

Code:

Reg. No:

Name :

KANNUR UNIVERSITY EXAMINATION
Complementary Botany 2-Model Question Paper
2C02BOT- PLANT DIVERSITY – ALGAE, BRYOPHYTA, PTERIDOPHYTA,
GYMNOSPERMS AND ANGIOSPERMS-REPRODUCTIVE BOTANY

Time: 3 Hours

Total Weightage: 30

Section - AAnswer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Floridean starch is a food product found in
 a) chlorophyceae b) pheophyceae c) rhodophyceae d) xanthophyceae
- ii) Most common type of ovule is
 a) anatropous b) orthotropous c) orthotropous d) circintropous
- iii) The cap like structure covering the capsule of moss
 a) stomium b) annulus c) operculum d) peristome
- iv) The number of microscope mother cells required for the production of 100 microspores is
 a) 100 b) 75 c) 50 d) 25

2. Write true or false

- i) Sargassum plant is a sporophyte.
 ii) Riccia sporophyte has foot and capsule.
 iii) In angiosperms endosperm is haploid.
 iv) Xenogamy is the process of transfer of pollen grains from the anther of a flower to the stigma of another flower of the same plant.

3. Fill in the blanks

- i) The loose textured wood of cycas is described as-----
 ii) Pollination by bats is known as-----
 iii) The main body of the ovule is enclosed in-----
 iv) The exine of pollen grain is made up of-----

4. Match the following

A	B
i) brown algae	Nitrogen fixation
ii) green algae	Undersea forests
iii) red algae	Tropical waters
iv) blue green alga	Terrestrial plants

5. Answer in one word

- i) Caruncle
 ii) Resurrection plant
 iii) Peristome
 iv) Name a free swimming colonial alga.

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Homospory and heterospory
 7. Endosperm and perisperm
 8. Sporophyte of Riccia and Funaria

9. Protonema and Prothallus
10. Dicot and monocot embryo
11. Coralloid and Rhizophore

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. What do you understand by the term double fertilization?
13. Morphology of Selaginella.
14. What evidence can you cite to indicate that Cycas is a living fossil?
15. Briefly describe the structure of Coenobium of Volvox.
16. Describe the monosporic embryosac development.
17. Give an account of vegetative reproduction in Bryophytes.
18. Enumerate the functions of Tapetum.

Section D

Answer any *Six*

(Short essay- type questions; each question carries a weightage of 2)

19. What is strobilus? Describe the structure of male cone of cycas with a labeled sketch.
20. Give a brief description of the micro and mega gametophyte of Selaginella.
21. With the help of a labeled diagram describe the structure and development of a Megasporangium.
22. Explain the internal structure of Riccia thallus with a neat labeled diagram.
23. Write an account on structure and reproduction of Batrachospermum.
24. With the help of diagrams briefly explain conjugation in Spirogyra.
25. 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
26. Write an account on asexual reproduction in algae.

Section E

Answer any *One*

(Essay- type questions; Each question carries a weightage of 4)

27. Describe structure and reproduction of Sargassum with the help of suitable diagrams. Add a note on its life cycle.
28. Give a diagrammatic representation and description of the gametophytic and sporophytic generations of Funaria. Comment on its alteration of generations.
29. With the help of neat labeled diagrams explain Microsporogenesis in angiosperms.

KANNUR UNIVERSITY**(Abstract)**

B.Sc Botany/Plant Science Programmes under CCSS- Model Question Papers for Core/Complementary/ General Courses-Implemented with effect from 2009 admission-Orders issued.

=====

ACADEMIC BRANCH

U.O No.Acad/C2/2471/2007

Dated, K.U Campus P.O,17-07-2010.
=====

Read: 1.U.O No Acad/C2/2471/2007(1) dated 08-07-2009.

2.U.O No Acad/C2/2471/2007 dated 08-04-2010.

3. Letter dated nil from the Chairperson, Board of Studies in Botany (UG).

ORDER

1)The Scheme and Syllabus of B.Sc Botany/Plant Science Programmes(Core/Complementary/General/Open Courses) and the Common pattern of Question Papers and Model Question Paper for II Semester Examinations of Botany Complementary Course were implemented in this University with effect from 2009 admission, vide paper read(1) &(2) above.

2) The Chairperson, Board of Studies in Botany (UG),vide paper read (3), has forwarded the Model Question Papers for the Examinations of Core/Complementary/General Courses of B.Sc Botany/Plant Science Programmes under Choice based Credit Semester System, for implementation with effect from 2009 admission.

3) 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 Model Question Papers for the following Core/Complementary/General Courses of B.Sc Botany/Plant Science Programmes under CCSS, with effect from 2009 admission*, subject to report to the Academic Council.

i) 3A06PLS-History and Philosophy of Science

ii) 4B03PLS-Herbal Science.

iii) 4A11PLS-Entrepreneuership

iv) **3C03BOT- Angiosperms–Morphological Variations, Systematics, Utility of Plants and Plant Pathology.**v) **4C04BOT- Plant Physiology, Angiosperm Anatomy and Crop Improvement**

4) The University Order read (1) & (2)stands modified to this extent.

5) Orders are issued accordingly.

6) The implemented Model Question Papers as detailed above are appended.

Sd/-

REGISTRAR

To:

The Principals of Colleges offering B.Sc Botany/Plant Science Programmes

Copy To:

1. The Examination Branch (through PA to CE)

2.The Chairperson, BOS in Botany (UG)

3. PS to VC/PA to PVC/PA to Regr

4. DR/AR I Academic 5. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER

Appendix to U.O No Acad/C2/2471/2007 dated 17-07-2010.

KANNUR UNIVERSITY EXAMINATION
Botany -Theory Model Question Paper

Reg. No:

Code:

Complementary Course – 3
CODE- 3C03BOT- Angiosperms-Morphological Variations, Systematics, Utility
of Plants and Plant Pathology

Time: 3 Hours

Total Weightage: 30

Section - A

Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) A pendant Inflorescence of unisexual flowers.
 a) Capitulum b) Spadix c) Umbel d) Catkin
- ii) Which of the following is not a plant fiber
 a) Coir b) Cotton c) Silk d) Jute
- iii) Causative organism of Blast disease of Paddy
 a) Phytophthora infestans b) Pyricularia oryzae c) Ustilago tritici
 d) Puccinia graminis.
- iv)) A Caryopsis is a fruit
 (a) that does not have a fruit wall (b) in which the fruit wall is fused with the
 seed coat (c) which is fleshy and contains many seeds. (d) that dehisces to expose
 the seeds violently

2. Write 'true or false'.

- i). A ligule is present in the leaves of grasses.
- ii) The fruit of Ragi is a caryopsis
- iii) Quincuncial is not an imbricate aestivation
- iv) Tapetum is the nutritive layer of pollen sac.

3. Fill in the blanks

- i) The standard size of a herbarium sheet is
- ii) Gynobasic style is found in the family
- iii) ----- is the causative organism of quick wilt of pepper.
- iv) A blue dye is obtained from the leaves of

4 Match the following

	A	B	C
i)	<i>Syzygium aromaticum</i>	Euphorbiaceae	Seed
ii)	<i>Manihot esculenta</i>	Myrtaceae	Rhizome
iii)	<i>Phaseolus radiatus</i>	Zingiberaceae	Flower bud
iv)	<i>Curcuma longa</i>	Papilionaceae	Tuberous root

5. Answer in one word or in one sentence

- i) Name a family showing stylopodium.
- ii) Define a nut.
- iii) Give the binomial of a medicinal plant, under Apocynaceae.
- iv). Etiology

Section -BAnswer any **Four**

- 6 Syngenesious stamen and Synandrous stamen.
7. Mosaic disease and Wilt disease.
8. Racemose and Cymose inflorescence.
9. Cereals and pulses
10. Artificial and phylogenetic systems of classification
11. Anthers in Malvaceae and Rutaceae.

Section CAnswer any **Five****(Short answer questions; each question carries a weightage of 1)**

12. What is a Cremocarp? Mention the family in which it is observed
13. Botanical name, family and useful part of Sesame
14. Write the floral formula of a named plant under Rutaceae.
15. What are the monocotyledonous features found in the family Annonaceae
16. Draw well labelled diagram of Flower L.S of a typical member of Rubiaceae
17. Describe the Gynoecium of Papilionaceae.
18. Write the symptoms of Grey leaf spot of Coconut and Quick wilt of pepper.

Section DAnswer any **Six****(Short-essay questions; each question carries a weightage of 2)**

19. Write short notes on Cyathium inflorescence
20. Write the pathogen, symptom and control measures of the disease Citrus canker
21. Discuss the advanced features of Asteraceae.
22. With illustrations describe the adnation in solanaceae.
23. Write about herbarium and herbarium techniques.
24. Bring out the special features in the corolla of Papilionaceae.
25. Write the botanical name, family, morphology of useful parts and uses of any four plants of various latex producing families that you have studied..
26. Write the pathogen, symptoms and control of Tapioca Mosaic disease.

Section EAnswer any **one****(Long-essay type questions; each question carries a weightage of 4)**

27. Explain the characteristic features of the family Orchidaceae. What are the advanced features found in the family.
28. Describe Bentham and Hooker's system of classification. Write the merits and demerits of this system
29. With the help of neat labelled diagrams describe the different types of fruits in angiosperms.

KANNUR UNIVERSITY EXAMINATION
Botany -Theory Model Question Paper

Reg. No:

Code:

Name :

Complementary course- 4

4C04BOT-Plant Physiology, Angiosperm Anatomy and Crop Improvement

Time: 3 Hours

Total Weightage: 30

Section - A

Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

3. Choose the correct answer

- i) Stomatal opening and closing is associated with
(C⁺ ions, H⁺ ions, K⁺ ions)
- ii) The process of crossing of two plants differing from each other genetically in one or more traits called
(Layering, budding, hybridization, scottee)
- iii) Growth ring are formed due to the activity of
(Primary cambium, Extra stellar cambium, Intra stellar cambium)
- iv) Water secreting glands in plants are
(Nectaries, Hydathods, Digestive glands)

4. Write 'true or false'.

- i). Cytokinins are used for root induction
- ii The process of response of plants to the relative length of light and dark is called photoperiodism
- iii). Tunica corpus theory was proposed by Nageli
- iv). Cortex is the region between endodermis and vascular bundles

4. Fill in the blanks

- i) vascular bundles are scattered in -----
- ii) -----is the root promoting hormone
- iii) The loss of water in the form of vapours from the cuticle is called-----
- iv) ----- is an example of intergeneric hybridization

5. Match the following

A	B
i) Sclerenchyma	EMS
ii) Guttation	ZnSO ₄
iii) Micronutrient	Support
iv) Mutagen	Hydathodes

5. Answer in one word or one sentence

- i. Maceration.
- ii. A cellular intrusion into vessel through the pit of parenchyma cell.
- iii. Abscisic acid
- iv. The process of removal of anthers before they dehisce and shed their pollen from the bisexual flowers of a plant.

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. C4 and CAM plants
7. Source and Sink.
8. Heart wood and Sap wood
9. Killing and fixing
- 10 Aneuploidy and euploidy.
- 11 Photoperiodism and vernalization.

Section CAnswer any *Five***(Short answer questions; each question carries a weightage of 1)**

12. What is plasmolysis?
13. Write about the anatomical adaptations of halophytes.
14. Mass selection.
15. Why xylem is considered as a complex Tissue?
16. Define turgor pressure.
17. Name the micronutrients and macro nutrients
18. Write an account of different simple tissues and complex tissues.

Section DAnswer any *Six***(Short-essay questions; each question carries a weightage of 2)**

19. How does secondary thickening occur in monocotyledons?
20. Explain the mechanism of Guttation.
21. Write about the anatomical adaptations in hydrophytes and xerophytes.
22. Give an account of N₂ metabolism in plants.
23. Describe the process of photorespiration in plants
24. Write the mechanism of sieve tube translocation in plants.
- 25 Write short notes about the importance of osmosis in plants
26. Give an account of hybridization technique.

Section EAnswer any *one***(Long-essay type questions; each question carries a weightage of 4)**

27. Describe the C3 cycle of photosynthesis in plants? How does it differ from C4 cycle?
28. What is meant by Anomalous secondary growth in thickness? Explain with suitable diagram, the anomalous secondary growth in Boerhaavia stem.
29. Give an account of growth hormones used in plants.

KANNUR UNIVERSITY**(Abstract)**

B.Sc Botany/Plant Science Programmes under CCSS- Model Question Papers-Core (Elective) and Open Courses along with modifications in the Model Question Papers of Core Courses-Implemented with effect from 2009 admission-Orders issued.

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ACADEMIC BRANCH

U.O No.Acad/C2/2471/2007

Dated, K.U Campus P.O,14-09-2010.

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- Read: 1.U.O No Acad/C2/2471/2007(1) dated 08-07-2009.
 2. U.O No Acad/C2/2471/2007 dated 08-04-2010.
 3. U.O No Acad/C2/2471/2007 dated 17-07-2010.
 4. Letters dated nil from the Chairperson, Board of Studies in Botany (UG).

ORDER

1) The Scheme and Syllabus of B.Sc Botany/Plant Science Programmes (Core/Complementary/General/Open Courses),the Common pattern of Question Papers along with Model Question Paper for II Semester Examinations of Botany Complementary Courses and that of the rest of the Core/Complementary/General Courses under Choice based Credit Semester System were implemented in this University with effect from 2009 admission, vide paper read(1),(2)& (3) above.

2) The Chairperson, Board of Studies in Botany (UG), vide papers read (4), has forwarded the Model Question Papers for B.Sc Botany/Plant Science Examinations of Core (Elective) & Open Courses along with certain modifications in some of the Model Question Papers of Core Courses by deleting question No.2 in Section A, to make it in tune with the common pattern as per paper read (2) above, for implementation with effect from 2009 admission.

3) 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 Model Question Papers for the Core (Elective) and Open Courses along with modifications in the Model Question Papers 4B04,5B05,5B06,5B07,6B13 & 6B14 of B.Sc Botany/Plant Science Programmes under CCSS, with effect from 2009 admission,*** subject to report to the Academic Council.

4) The University Orders read above stand modified to this extent.

5) Orders are issued accordingly.

6) The implemented Model Question Papers as detailed above are appended.

Sd/-

REGISTRAR

To:

The Principals of Colleges offering B.Sc Botany/Plant Science Programmes

Copy To:

1. The Examination Branch (through PA to CE)
2. The Chairperson, BOS in Botany (UG)
3. PS to VC/PA to PVC/PA to Regr
4. DR/AR I Academic 5. SF/DF/FC.

Forwarded/By Order

SECTION OFFICER

Appendix to U.O.No.Acad/C2/2471/2007 dated 14-09-2010.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany -Theory Model Question Paper

Reg. No:

Code:

**CODE- 6B19PLS/BOT (i)- ELECTIVE COURSE -1- UTILITY OF PLANTS AND
 MEDICINAL BOTANY**

Time: 3 Hours**Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Useful part of Ragi is
 a) caryopsis b) seed c) embryo d) fruit
- ii) The family of Pineapple
 a) Moraceae b) Pinaceae c) Bromeliaceae d) Musaceae
- iii) Mace belongs to the family
 a) Poaceae b) Fabaceae c) Myristicaceae d) Brassicaceae
- iv) The oil obtained from oil palm
 a) palm oil b) palm kernel oil c) both d) none

2. State true or false

- i) Sweet potato is an industrial crop.
 ii) Cinnamon is obtained from the leaves.
 iii) At the time of latex collection, ammonia is added to avoid pre-coagulation.
 iv) Edible part of apple is a pseudocarp.

3. Fill in the blanks

- i) Palm oil is extracted fromof the plant.
 ii) The fibre used for making twines, ropes etc.
 iii) In Pineapple, mature fruit contains and acid.
 iv) Cumin belongs to the family

4. Match the following

	A	B	C
i)	Gram	Mung bean	Glycine
ii)	Green gram	Pigeon pea	Cicer
iii)	Soya bean	Chick pea	Cajanus
iv)	Cajan pea	Japan Pea	Phaseolus

5. Answer in one word or in one sentence

- i) Poor man's milk
 ii) Tridhoshic concept
 iii) Ethnomedicine
 iv) latex

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

- 6.** Root tuber crops and Stem tuber crops
7. Condiments and Spices

8. Indigo and Henna
9. Cereals and Pulses
10. Traditional medicine and Modern medicine
11. Black tea and Green tea..

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Write a note about the morphology of useful part of Para Rubber, giving its botanical name, family and uses.
13. Write the botanical name of any four tropical fruits
14. Mention the botanical name, family, useful part and economic uses of Jute. Where does it grow in India?
15. Suppose that all plants of the world were to be destroyed except those belonging to five plant families. Which families would you select and why?
16. Give the botanical name and family of any fibre-yielding fruit and give its uses.
17. Give a general account of the plants whose economic products are exported from India.
18. Write about the different sugar-yielding plants.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Write about the economically important plants under Myrtaceae.
20. What do you mean by beverage? Write about the common beverage yielding plants giving their binomial, family and useful parts.
21. Select out the plants whose leaves are mainly useful. Add a note on their binomial, family and uses.
22. What are the major plant families producing vegetables, add a note on them and write the binomial of the plants you have studied under each.
23. Describe the different crude drugs obtained from the different vegetative parts of the plant body, giving botanical name, family, useful part and uses of the plants used.
24. Discuss the role of AYUSH, NMPB, CIMAP, CDRI and CMPR
25. Write a short essay on the different spices and condiments we use.
26. Write about the economic importance of mustard oil and coconut oil

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Write an essay on the importance of plants in primary healthcare citing examples of the common medicinal plants you have studied.
28. Discuss the importance of selected plant examples in Traditional vs. Modern medicine with special emphasis on structure, usage and pharmacological action of active principles.
29. With an introduction to each group, discuss the botanical name, family, morphology of useful parts and utility of the plants you have studied under major food items.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany -Theory Model Question Paper

Reg. No:

Code:

ELECTIVE COURSE – 2

CODE- 6B19PLS/BOT (ii) - PLANTATION BOTANY

Time: 3 Hours

Total Weightage: 30

Section - AAnswer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) is called secondary nutrients
 (a) NPK (b) Mg,Ca,S (c) Organic manures (d) none of these
- ii) A step-like configuration of the field along the contour by half filling to minimize soil erosion
 (a) Contour planting (b) terracing (c) healing (d) none of these
- iii) Mixing of fertilizer with irrigated water is called.....
 (a) irrigation (b) saponification (c) fertigation (d) hydrogenation
- iv) Gangabondam is a variety of
 (a) Cardamom (b) Pepper (c) Turmeric (d) Coconut

2. Write 'true or false'.

- i). India is the largest exporter of tea in the world.
- ii) FYM is a type of chemical fertiliser.
- iii) Kattapak and Kalipak are the products of coconut.
- iv) Bordeaux mixture is a fungicide.

3. Fill in the blanks

- i)is an example of polygamomonoecious plant.
- ii) In Rubber, the latex obtained from the bark of the tree by a process called
- iii) Growing two or more vegetables in the same field at the same time is called
- iv) -----is the inflorescence of Arecanut.

4 Match the following

A	B
i) Camelliaceae	Coffee
ii) Euphorbiaceae	Cashew
iii) Anacardiaceae	Rubber
iv) Rubiaceae	Tea

5. Answer in one word or in one sentence

- i). Plant protectant
- ii). IPM.
- iii) Etiology
- iv). Agronomic practice

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

- 6 Inflorescence of Cashew and Rubber.

7. Pesticides and Herbicides
8. Biofertilizers and Biocontrol agents.
9. Macro and Micronutrients.
10. Introduction and Acclimatization.
11. Hybridization and Micropropagation.

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Harvesting and processing of Coffee.
13. Explain the botany of Arecanut.
14. Write the processing of Cashew.
15. Briefly describe the importance of soil and climate in agronomic practices.
16. Write a note on cultivation of Cashew.
17. Write a note on Budding.
18. Write about the importance of plantation crops in the economy of India.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Write about the origin, distribution, morphology, taxonomy, floral biology and morphology and biochemistry of the useful part of Tea.
20. Critically evaluate the present status of plantation crops in Kerala.
21. Explain harvesting and processing of Arecanut.
22. Write an explanatory note on nursery practices and production of planting materials..
23. What are the different plant introduction and selection techniques? Explain.
- 24..Write two fungal diseases of Coffee, their symptoms and control measures.
25. Write a note about the manures used in plantation crops.
26. Discuss the various growth regulators of plantation crops.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. With the help of labeled diagrams explain the propagation methods of plantation crops.
28. Justify the statement that “Tissue cultural technique is considered as an essential component of modern plant improvement programs”.
29. Write the Botany, propagation, harvesting, storage and processing of the products of Coconut.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany -Theory Model Question Paper

Reg. No:

Code:

ELECTIVE COURSE – 3

CODE- 6B19PLS/BOT (iii)- **NURSERY MANAGEMENT AND MUSHROOM
CULTIVATION**

Time: 3 Hours

Total Weightage: 30

Section - AAnswer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The resting period of soil is called
(a) Fallow period (b) soil treatment (c) soil preparation (d) mulching
- ii) Drip irrigation is otherwise called
(a) can watering (b) dry watering (c) mimicking a rain (d) fertigation
- iii) Sprinkler irrigation is practiced in crops.
(a) mushroom (b) vegetables (c) fruit crops (d) none of these
- iv) The reproductive part of spawn is
(a) seed (b) culture (c) mycelia (d) grain

2. Write 'true or false'.

- i). In India 90% of cultivation is Button Mushroom
- ii) Flat bed is mostly used during spring season..
- iii) Sphagnum moss is mostly used in the cultivation of Volvoriella species.
- iv) pH 7 is an acid soil..

3. Fill in the blanks

- i) Sunken nursery bed is prepared during season.
- ii) is the white button mushroom
- iii) Mushroom is cultivated by method
- iv) is called primary nutrients

4 Match the following

A	B
i) Green house	Vermiculate
ii) Organic manure	Spawning
iii) Pleurotus spp.	Watering
iv) Gravity irrigation	Nursery management

5. Answer in one word or in one sentence

- i). Soil treatment
- ii). Fallow period
- iii) Hot beds
- iv). Cold frames

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

- 6 Drip and Sprinkler irrigation.
7. Mulching and Spawning

8. Edible and Poisonous mushrooms.
9. Crop management and Crop rotation.
10. Flat beds and Raised beds.
11. Spawn run room and Cropping room

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Write a note about soil preparation.
13. With the help of diagrams explain various types of nursery beds.
14. Describe the nutritive value of Mushroom.
15. Write the importance of nursery management.
16. What are the preplanting treatments practiced in the nursery bed?
17. Write a note on fertilizers.
18. Discuss the requirements of a culture room.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Explain various types of irrigation methods.
20. Explain the process of transplantation of nursery plants.
21. Write a note about plant growing structures.
22. Explain the preparation of Bordeaux mixture.
23. Write the main characters of edible mushrooms.
24. Explain in detail five different types of garden tools and give their uses
25. Describe the harvesting and post-harvest management of mushrooms.
26. Write a note about the scope of nursery management and mushroom cultivation.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Explain the procedure of the cultivation of Paddy straw mushroom.
28. Describe the process of nursery management and media preparation.
29. Explain the procedure of cultivation of *Agaricus bisporus*.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany -Theory Model Question Paper

Reg. No:

Code:

CODE- 6B19PLS/BOT (iv)- ELECTIVE COURSE -4- ETHNOBOTANY

Time: 3 Hours

Total Weightage: 30

Section - A

Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The Goddess Lakshmi is believed to reside in
 a) Water lily b) Aegle c) Nerium d) Tulsi
- ii) Tender shoots used as vegetable
 a) Aegle b) Achyranthes c) Dioscorea d) Entada
- iii) Plant in sacred grove and having miscellaneous use
 a) Helicteres b) Calotropis c) Carissa d) Bambusa.
- iv) In India is considered as the prison of all demons.
 a) Strychnos b) Mango c) Alstonia d) Burning incense

2. Write 'true or false'.

- i). *Aegle marmelos* belongs to the family Myrtaceae
- ii) Ethnobotany has no connection with other sciences.
- iii) Ethnomycology deals with the study and use of fungi by man for several purposes.
- iv) Ethnic people live in localities immensely rich in biodiversity.

3. Fill in the blanks

- i) The term 'Ethnobotany' was first used by a botanist namedin the year
- ii) Ritualistic dances and dramatizations based on the local deities that protect the groves are called -----in Kerala.
- iii) -----is the name attributed to sacred grove in native language.
- iv) The word 'Ethnobotany' comes from -----study of culture andstudy of plants.

4 Match the following

	A	B
i)	India	Red Indians
ii)	Greenland	Scheduled Tribe
iii)	Costa Rica	Hill Tribes
iv)	Bangladesh	Eskimos

5. Answer in one word or in one sentence

- i). Father of Ethnobotany
- ii) Name two tribal communities in South India.
- iii) Define Ethnobotany
- iv) The founding father of modern Ethnobotany..

Section -B

Answer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

- 6 Ethno ecology and Ethno taxonomy
7. Traditional and Modern Ethnobotany

8. Shifting Cultivation and Crop Rotation
9. Anthropology and Palaeoethnobotany
10. In situ and ex situ conservation
11. Ethno pharmacology and Ethno toxicology

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. List out the names of 2 scientific journals covering ethnobotanical research.
13. What are the functions of an ethno botanist?
14. In the beginning, ethnobotanical specimens and studies were not very reliable and not much helpful. Why?
15. Write about the historical background of Umbrella stones.
16. List out the names of sacred groves and Socio- religious belief.
17. Tribals strictly following the customs and habits are found to be healthier. Why?
18. Name the important plant ecosystems preserved in Kerala by religious beliefs.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. A great deal of information about the traditional use of plants is still intact with the tribals. Why?
20. Write a note on umbrella stones.
21. Write about the practical applications of Ethnobotany.
22. Explain the belief behind the custom of hammering nails into sacred trees.
23. Write a note on shifting cultivation and environmental change.
24. What is the purpose of ethnobotanical journals?
25. Describe about ethnic agricultural practices..
26. Describe the importance of Ethnobotany in gene pool conservation.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. What is Ethnobotany? Examine the importance, scope, categories and significance of Ethnobotany.
28. Discuss the role of ethnic and indigenous people of India and their culture in the conservation of biodiversity.
29. Explain the linkage of Ethnobotany with food and nutrition, medicine, sociology and culture and religion and social customs.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany -Theory Model Question Paper

Reg. No:

Code:

CODE -6B19PLS/BOT (v) - ELECTIVE COURSE-5- PHARMACOGNOSY**Time: 3 Hours****Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Which part of *Zingiber officinale* is used as drug?
a) leaf b) rhizome c) flower d) root
- ii) *Aloe barbadens* belongs to the family
a) Euphorbiaceae b) Liliaceae c) Acanthaceae d) Solanaceae
- iii) The non-crystalizable compound soluble in hot water
a) Resins b) Tannins c) Terpenoids d) alkaloids
- iv) The German Scientist who introduced the term 'Pharmacognosy'
a) Pliny b) Schleiden c) Seydler d) Galen

2. State true or false

- i) *Gloriosa superba* belongs to the family Euphorbiaceae.
- ii) Phenolics are secondary metabolites.
- iii) Natural system of classification is included in the classification of crude drugs.
- iv) *Adhatoda vasica* is endemic.

3. Fill in the blanks

- i) *Ferula asafetida* belongs to the family
- ii) The word pharmacognosy is derived from.....
- iii) System in which drugs are arranged according to their morphological or external characters is known as
- iv)plant yield alkaloid from fruit.

4. Match the following

	A	B	C
i)	<i>Adhatoda</i>	Zingiberaceae	Flower
ii)	<i>Datura</i>	Acanthaceae	Bulb
iii)	<i>Allium cepa</i>	Solanaceae	Rhizome
iv)	<i>Zingiber</i>	Liliaceae	leaf

5. Answer in one word or in one sentence

- i) Ashtanga hridaya
- ii) Any two soil types suitable for crude drugs.
- iii) Phytochemistry
- iv) Evaluation.

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Tannins and Dyes
7. Pharmacology and Pharmacognosy

8. Alkaloids and Turpenols
9. Pharmacological and Taxonomic classification
10. *Vetiveria zizanioids* and *Scoparia dulcis*
11. Anatomical and chemical evaluation

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. How terpenoids are classified? Mention their pharmaceutical importance.
13. What is meant by secondary metabolites?
14. Write about endemic plants, giving two examples.
15. Describe and name two plants whose rhizome is used as medicine.
16. What is meant by organoleptic evaluation?
17. Write the functions of phenolics.
18. Write the cultivation method of any plant used in Ayurveda.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. What are the merits and demerits of cultivation? Discuss various factors affecting cultivation.
20. Write about the sources of crude drugs.
21. Explain the phytochemistry and pharmacological action of a) *Gloriosa superba* b) *Phyllanthus amarus* c) *Allium cepa* d) *Datura alba*
22. Write detailed notes on morphological and chemical classifications.
23. Give a general account of medicinal plants used in Ayurveda.
24. What are alkaloids? Describe their properties and functions.
25. Give a detailed account of the historical background of pharmacognosy and add a note on its scope.
26. Describe the method of extraction of crude drugs.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Explain the various systems of classification of drugs from natural resources.
28. Write about the major ayurvedic preparations and formulations you have studied.
29. Give a detailed account of secondary plant metabolites and their properties.

KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany -Theory Model Question Paper

Reg. No:

Code:

ELECTIVE COURSE – 6

CODE- 6B19PLS/BOT (vi) -

SEED TECHNOLOGY

Time: 3 Hours

Total Weightage: 30

Section - AAnswer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The production of seeds by asexual methods is called
(a) Apomixis (b) Agamospermy (c) adventitious embryony (d) diplospory
- ii) Most commonly used test to determine seed viability
(a) Tetrazolium test (b) germination test (c) vital colouring method (d) enzyme activity method
- iii) Long-lived seeds are called
- (a) viable (b) recalcitrant (c) orthodox (d) none of these
- iv) The point at which seed achieves its maximum dry weight is called ...
(a) performance potential (b) physiological maturity (c) harvest maturity (d) none

2. Write 'true or false'.

- i). Stratification is the chemical and mechanical removal of seed coat.
- ii) Based on the fate of cotyledons or storage organs, there are two types of germination.
- iii) Many tissues of plants can be induced to initiate and develop embryos.
- iv) Mycotoxin in the food is produced chiefly by species of *Aspergillus* and *Fusarium*.

3. Fill in the blanks

- i)is the barrier between embryo and its immediate environment.
- ii) is the most successful and best advanced method of seed storage.
- iii) A widespread cause of seed dormancy is the presence of a
- iv) test utilizes the activity of dehydrogenase enzymes as an index to the respiration rate of viable seeds.

4 Match the following

A	B
i) Afterripening	Seed testing
ii) perisperm	Orthodox
iii) Roberts	Dormancy relieving
iv) AOSA	Nucellus

5. Answer in one word or in one sentence

- i).Seed viability
- ii).Quarantine
- iii) Food storage reserves
- iv).ISTA

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

- 6 Embryo and Coat-imposed dormancies

7. Primary and Secondary dormancy.
8. Seed bank and Seed gene bank.
9. Transient and Persistent .seed banks
10. Scarification and Stratification
11. Orthodox and Recalcitrant seeds

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Write a note about food storage structures of seeds.
13. Prolonged seed storage is important for those of wild plants also. Why?
14. What do you mean by a hard seed coat?.
15. What is the origin and meaning of the term *stratification*?.
16. What are the requirements for seed germination? Explain.
17. Write a note on containerized seed storage.
18. Critically examine the statement that the most successful and best advanced method of seed storage is that of cryopreservation.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Explain various types of seed dormancy .
20. Write about the processing of seeds for propagation in Agriculture.
21. Describe the four different stages in the development of a seed.
22. Explain why seeds placed in sealed storage at 13% moisture will deteriorate more rapidly than seeds in open storage? .
23. Is it correct to describe dormancy as merely a resting state? Explain..
- 24..Classify the seeds based on various parameters.
25. Describe the various methods of breaking seed dormancy.
26. Write a note about the somatic embryogenesis and organogenesis as a means of propagation.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Explain the various ways by which seeds are useful for the wellbeing of mankind.
28. Describe the process of seed formation and development mentioning the important factors affecting the process.
29. Write about the factors affecting the life span of seeds.

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5D01BOT/PLS(i) OR 6D02BOT/PLS(i) -OPEN COURSE -1. HORTICULTURE**Time: 3 Hours****Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The process of breaking dormancy of seed by cracking is called as
 a) Scarification b) stratification c) sterilization d) none of these
- ii) The development of embryo through asexual reproduction is called as
 a) Apospory b) apogamy c) Apomixis d) none of these
- iii)----- are called the primary nutrients in plants
 a) Mn Zn K b) NPK c) Ca Mg K d) None of these
- iv) The branch of horticulture, which deals with the cultivation of fruits, is
 a) Pomology b) Olericulture c) palynology d) floriculture

2. True or false

- i) Mycorrhizae are beneficial fungi that grow in a plant, symbiotic relationship on the root
- ii) Growing of two or more vegetable crops in the same field at the same time is called mixed cropping
- iii) Removal of moisture under controlled conditions of temperature, humidity and flow of air is called scarification
- iv) Post harvested treatment given to vegetables for fast healing of mechanical injury, lowering the moisture contact and reducing the rotting of fungal growth is called curing

3. Fill in the blanks

- i) A natural green carpet of garden in called-----
- ii) The branch of horticulture, which deals with the cultivation of trees, is called-----
- iii) Covering of an area, preferably a bed or a series of beds with dense, low growing herbaceous plants, creating some letters is called-----
- iv) A step like configuration of the field along the contour, by half cutting and half filling, to minimize soil erosion is called as-----

4. Match the following

	A	B
i)	Snake gourd	<i>Momordica charantia</i>
ii)	Bitter gourd	<i>Lycopersicon esculentum</i>
iii)	Ladies finger	<i>Trycosanthes anguina</i>
iv)	Tomato	<i>Abelmoschus esculentus</i>

5. Answer in one word or in one sentence

- i) Mulching ii) Vermiculite iii) Water garden iv) Peat

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Rockery and Topiary

7. Olericulture and floriculture

8. Hedges and edges

9. Centering and tipping

10. Irrigation and fertigation
11. Hot bed and cold frame.

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Why orchids are not propagated by seeds?
13. What is the significance of glass houses in Horticulture?
14. What may be done to increase the storage of some cut flowers?
15. During rooting periods of bulbs and corms, soil should be low in nitrates- explain.
16. What are suckers? How suckering can be promoted?
17. Write a critical note on drip irrigation.
18. Briefly describe the method of potting orchid plants.

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. What are the parameters to be taken care during the harvesting of flowers?
20. Give a brief description of different methods of pruning and its significance in trees.
21. Write briefly on the cultivation methods used in Anthurium. Give the name of two commonly cultivated varieties.
22. Describe at least three different types of layerage and indicate their special applications.
23. Describe the principal practices of a production unit in a nursery.
24. Describe the common garden tools and implements.
25. Give an account of various plant protection measures for horticultural crops.
26. Write briefly on the cultivation methods used in Tomato, Bhindi and Brinjal.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Describe the various steps to grow Bonsai.
28. How can a good lawn be prepared?
29. Give an account of the different types of growth regulators and their uses in Horticulture.

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5D01BOT/PLS(ii) OR 6D02BOT/PLS(ii) -OPEN COURSE -2.**MUSHROOM CULTIVATION AND MARKETING****Time: 3 Hours****Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The largest producer of mushroom
 a) India b) USA c) China d) Germany
- ii) Oyster mushrooms are
 a) *Agaricus* b) *Pleurotus* c) *Volvariella* d) None of these
- iii) Umbrella shaped portion of basidiocarp is
 a) Pileus b) Stipe c) Gill d) Annulus.
- iv) ----- is popularly known as Chinese mushroom.
 a) *Agaricus* b) *Pleurotus* c) *Volvariella* d) None of these

2. True or false

- i) Sphagnum moss is mostly used in the cultivation of *Volvariella sp.*
- ii) In India 90% of cultivation is Button mushroom.
- iii) Primary mycelium grows by clamp connection.
- iv) N. Bahl has introduced the polythene bag method for growing paddy straw mushroom.

3. Fill in the blanks

- i) ----- is the white button mushroom.
- ii) *Agaricus* belongs to the class -----.
- iii) Fruiting body of mushroom is known as -----
- iv) Interwoven fungal mycelium twist to form a rope like structure known as -----

4. Match the following

	A	B
i)	i) <i>Agaricus</i>	Oyster mushroom
ii)	ii) <i>Volvariella</i>	Button mushroom
iii)	iii) <i>Pleurotus</i>	Poisonous mushroom
iv)	iv) <i>Amanita</i>	Paddy straw mushroom

5. Answer in one word or in one sentence

- i) Dolipore septum
- ii) Spawn
- iii) Blanching
- iv) Velum

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Sun drying and freeze drying
7. Edible mushroom and poisonous mushroom
8. Hymenium and sub hymenium
9. Homothallism and heterothallism
10. Primary mycelium and secondary mycelium
11. Spawn run room and cropping room

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Name any poisonous species of *Agaricus*.
13. What is heterokaryotic condition?
14. Name two edible species of *Pleurotus*.
15. Scientific name of Indian Oyster mushroom.
16. What are the medicinal values of milky mushroom?
17. Who is the father of Mycology?
18. How many basidiospores are produced in a basidium?

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Write down the economic importance of *Agaricus*.
20. Write a short account on nutritive values of mushrooms.
21. What are the main characters of edible mushroom?
22. Give an account of common pests associated with mushrooms.
23. With the help of a labeled diagram describe the structure of *Agaricus* gill.
24. Give an account of poisonous mushrooms.
25. What are the different methods adopted for storage of mushrooms?
26. Comment on mushroom marketing.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Explain the life cycle of *Pleurotus* with the help of diagrams.
28. Describe the cultivation of Paddy straw mushroom.
29. Write an account on mushroom processing.

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5D01BOT/PLS(iii) or 6D02BOT/PLS(iii)- Open Course-3

ENVIRONMENTAL SCIENCE

Time: 3 Hours**Total Weightage: 30**

Section - A

Answer *All*

(Questions in bunches of four; each bunch carries a weightage of 1)

1. Choose the correct answer

- i. Trophic levels are formed by
 (a) Only plants (b) Only animals (c) Only carnivores (d) Organisms linked in food chains
- ii. The pyramid of energy is
 (a) Always erect (b) Always inverted (c) Erect or inverted (d) None of these
- iii. Deforestation reduces the chance
 (a) Rain fall (b) Frequent cyclones (c) Soil erosion (d) Land slides
- iv. Lichens are important in the study of atmosphere pollution because they
 (a) Can grow well in polluted atmosphere (b) Can purify the atmosphere (c) Are sensitive to pollutant (d) None of these

2. True or false

- i. Acid rains are caused by increased atmospheric concentration of NO₂ and SO₂
- ii. Heterophylly is found in submerged hydrophytes
- iv. Vivipary is a characteristic feature of halophytes
- v. The major reason for diminishing wild life is environmental pollution

3. Fill in the blanks

- i. Every year, 5th June is celebrated as -----
- ii. Bhopal gas tragedy occurred in the year-----
- iii. ----- book includes the list of threatened plants and animals.
- iv. Afforestation with the purpose of environmental, aesthetic and economic development is known as -----

4. Match the following

	A	B
i.	Sunken stomata	Hydrophytes
ii.	Velamen root	Halophytes
iii.	Pneumatophore	Xerophytes
iv	Air chamber	Epiphytes

5. Answer in one word or in one sentence

- i Minamata disease
- ii. Itai- itai disease
- iii. Food web
- iv. Climax community

Section -B

Answer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Alpha diversity and Beta diversity
7. Parasite and Epiphyte

8. Social forestry and Agro forestry
9. Renewable and non renewable energy resources
10. Primary succession and secondary succession
11. Grazing food chain and detritus food chain.

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. The following is sequence of individuals linked through food
Wheat → rat → cat → dog → lion
 - a) What is this sequence called?
 - b) Which one represents the primary consumer?
13. In a particular locality, the organisms and the surrounding are reciprocally related.
 - a) What is the name given to such an integrated system?
 - b) What is the driving force of such a system?
14. Cactus plants can grow in areas exposed to drought
 - a) To which group does cactus belong?
 - b) How do these plants manage drought?
15. Epiphytes develop a special tissue to absorb moisture from the atmosphere.
 - a) Name the tissue
 - b) What is its morphology?
16. Pollutants after production may often interact.
 - a) What is the name given to the product of interaction?
 - b) Give an example for such product.
17. What is nuclear holocaust?
18. Write the full forms of the following: a) MIC b) PAN

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Write down the benefits and controversies regarding the construction of dams
20. Enumerate the benefits of forest resources
21. Mining poses several long term occupational hazards to the miners. Substantiate.
22. Give an account of Green house effect
23. What are the significances of rain water harvesting?
24. How does ozone layer protect us? What are the impacts of ozone layer depletion?
25. Write a critical note on radioactive pollution.
26. What are the reasons for population explosion?

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Compare the morphological and anatomical adaptations in Hydrophytes and xerophytes
28. What is *in situ* conservation? Explain the different types of protected site. Add a note on environment (protection) act.
29. List out the effect of air pollution and discuss the methods for solving/reducing air pollution.

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5D01BOT/PLS(iv) OR 6D02BOT/PLS(iv) -OPEN COURSE-4**MEDICINAL PLANTS****Time: 3 Hours****Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; each bunch carries a weightage of 1)

1. Choose the correct answer

- i). The German scientist who introduced the term 'Pharmacognosy' is
a) Galen b) Schleiden c) Plini d) Seydler
- ii) Atropine is obtained from
a) Belladonna b) Opium c) Aloe d) Vinca
- iii) Which part of Asparagus is used as drug?
a) Leaf b) Root c) Stem d) Flower
- iv) *Adhathoda vasica* is indigenous to
a) India b) China c) Madagascar d) None of these

2. True or false

- i) NBPGR is National Board of Plant Genetic Resources.
- ii) *Centella* belongs to the family Apiaceae
- iii) *Asparagus* contains the glycosides shatavarins
- iv) *Catharanthus* is indigenous to India

3. Fill in the blanks

- i) Removal of dirt, sand, debris from crude drug is known as-----
- ii) Homeopathic system of medicine was introduced by-----
- iii) The process in ayurveda which leads to eradication of toxicity of harmful substance is called as -----.
- iv) *Allium cepa* belongs to the family -----.

4. Match the following

	A	B
i)	<i>Zingiber</i>	Apocynaceae
ii)	<i>Aloe</i>	Euphorbiaceae
iii)	<i>Catharanthus</i>	Zingiberaceae
iv)	<i>Phyllanthus</i>	Liliaceae

5. Answer in one word or in one sentence

- i) FRLHT
- ii) Adulteration of drugs
- iii) Unani system of medicine
- iv) Phamacognosy

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Ex situ conservation and in situ conservation
7. Organized drug and unorganized drug
8. Quill bark and double quill bark
9. Alkaloid and glycoside
10. Biological source and geographical source of drug
11. Analgesic and antiemetic.

Section C

Answer any *Five*

(Short answer questions; each question carries a weightage of 1)

12. Father of Indian ethnobotany.
13. Name two tribal communities in south India.
14. Name two plants whose rhizome is used as medicine.
15. Name the alkaloids in *Vinca*, which are active against malignant tumor.
16. Expand (a) ICAR (b) IMPB.
17. Head quarter of BSI.
18. What is diuretic?

Section D

Answer any *Six*

(Short-essay questions; each question carries a weightage of 2)

19. Write a short note on major tribes of South India.
20. Briefly describe the role of NBPGR in cultivation and conservation of medicinal plants.
21. What are the major IPR issues related with cultivation and marketing of medicinal plants.
22. Give an account of cultivation of *Hemidesmus* and *Acorus calamus*.
23. Explain the role of major growth regulators in vegetable drug production.
24. List out the plants coming under 'Dhasapushpa' in ayurveda.
25. Write down any five folk medicines in Kerala and their uses.
26. Give an account of Sacred Groves.

Section E

Answer any *one*

(Long-essay type questions; each question carries a weightage of 4)

27. Comment on various methods used for adulteration of drugs.
28. Write an account on classification of vegetable drugs.
29. Write an essay on Wild food plants.

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5D01BOT/PLS(v) OR 6D02BOT/PLS(v) -OPEN COURSE -5**FORESTRY****Time: 3 Hours****Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Deforestation generally decreases
 a) Soil erosion b) Rain fall c) Drought d) Global warming
- ii) Chemically all gums are
 a) Polysaccharides. b) Proteins c) Lipids d) Vitamins
- iii) Which of the following is not a germinating stimulating compound?
 a) KNO_3 b) Thiourea c) Parasorbic acid d) Ethylene.
- iv) Extensive planting of trees to increase cover is called.
 a) Aforestation b) Social forestry c) Agro forestry d) Deforestation

2. True or false

- i) 2, 3, 5, triphenyl tetrazolium chloride is used for testing the viability of seeds.
- ii) The National Forest Policy has recommended 50% forest area in India.
- iii) Early wood is otherwise called as spring wood.
- iv) Turpentine is obtained from coniferous trees.

3. Fill in the blanks

- i) Chipko movement in Tehri Garhwal region was initiated by -----.
- ii) The cell or row of cells containing latex is called -----.
- iii) Light coloured outer region of wood is known as -----
- iv) Forest research Institute of India is in -----

4. Match the following

	A	B
i)	White dammer	<i>Canarium strictum</i>
ii)	ii) Black dammer	<i>Dalbergia sisso</i>
iii)	iii) Rose wood	<i>Coscinium fenestratum</i>
iv)	iv) Tree turmeric	<i>Vateria indica</i>

5. Answer in one word or in one sentence

- i) Silviculture
- ii) Coppice
- iii) Seed dormancy
- iv) Deciduous forest

Section -BAnswer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Porous wood and non-porous wood
7. Taungya system and Jhum system of cultivation
8. Spring wood and autumn wood
9. Scarification and stratification
10. Grain and texture
11. Tropical forest and temperate forest

Section C

Answer any five

(Short answer questions; each question carries weightage of 1)

12. Name any two physical methods to overcome seed dormancy.
13. What is Lac?
14. Define heart wood.
15. What is heterogenous wood?
16. Name two fibre yielding plants.
17. Expand KFRI.
18. What are veneers?

Section D

Answer any six

(Short answer questions; each question carries a weightage of 2)

19. Describe various chemical methods to overcome seed dormancy.
20. List out the anatomical peculiarities of Jack wood and Teak wood.
21. Write down the ethnobotanical importance of *Aegle marmelos*.
22. Write an account of social forestry.
23. Describe the salient features of Indian Forest Act 1927.
24. Explain the importance of agroforestry.
25. Write a short note on the economic importance of *Dalbergia sisso*.
26. Explain the important measures to conserve forest.

Section E

Answer any one

(Essay type question; each question carries a weightage of 4)

27. Give an account of non timber forest products.
28. Briefly describe the forest types of India.
29. Explain the important physical properties of wood.

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CODE- 5D01BOT/PLS(vi) OR 6D02BOT/PLS(vi) - OPEN COURSE -6
BIOTECHNOLOGY

Time: 3 Hours**Total Weightage: 30****Section - A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer

- i) The forensic scientist obtained a small blood stained cloth of the suspect from the crime site. Which technique can be used to obtain sufficient amount of DNA present in the blood stain for further analysis?
 a) PCR b) pH meter c) Western blotting d) Northern blotting
- ii) Renuka isolated a gene 3000bp long, which she desires to cut into two. Which molecular tool would she use?
 a) Klenow fragment. b) Restriction enzyme c) DNA polymerase d) Ligase
- iii) Which technology involves combining two cells without cell walls from different species?
 a) clonal propagation b) somatic embryogenesis c) protoplast fusion d) somaclonal variation.
- iv) Karun inoculated a leaf segment into a medium containing auxins and cytokinins. After a month, he observed a white mass of cells in the culture. Name it.
 a) Callus b) meristem c) shoot tip d) callose

2. True or false

- i) RFLP stands for Restriction Fragment Length Polyploidy
- ii) Nif gene incorporated transgenic rice plant is capable of utilizing atmospheric N₂.
- iii) Gene therapy is a term used for replacing a defective mutant allele with a functional allele.
- iv) Murashige is considered as the father of plant tissue culture.

3. Fill in the blanks

- i) ----- denotes the genetic capacity of a cell to regenerate into a complete plant
- ii) A small circular DNA present in bacterial cells which is used in genetic engineering is called as -----.
- iii) ----- bacterium is used in gene transfer in plants.
- iv) The culture method for raising haploid plants is-----

4. Match the following

	A	B
i)	Restriction enzyme	<i>Agrobacterium rhizogenes</i>
ii)	Ri plasmid	Arber
iii)	DNA fingerprinting	<i>Agrobacterium tumefaciens</i>
iv)	Ti plasmid	Alec Jeffreys

5. Answer in one word or in one sentence

- i) FISH ii) PUC iii) cDNA iv) RAPD

Section BAnswer any *Four***(Differentiate between the following: Each question carries a weightage of 1)**

6. Ti plasmid and Ri plasmid
7. RFLP and RAPD
8. Restriction endonuclease and Ligase
9. Genomic library and cDNA library
10. Electroporation and Microinjection
11. Western blotting and Northern blotting

Section CAnswer any *five***(Short answer questions.; each question carries weightage of 1)**

12. How can you obtain virus-free sugarcane plants from virus-infected plants? Are these plants virus-resistant? Give reasons.
13. What are edible vaccines? Mention two advantages of developing edible vaccines.
14. Why is nutrient medium autoclaved before it is used for tissue culture? How will you sterilise hormones, justify.
15. What is a cDNA library? List two advantages of a cDNA library over a genomic library.
16. Give a brief account of biosensors
17. How does a doctor utilise nanobiotechnology to treat cancer?
18. In which direction does the DNA fragment resolve in an electrophoretic gel. and why?

Section DAnswer any *six***(Short answer questions; each question carries a weightage of 2)**

19. A scientist wishes to prevent unauthorized copying of his invention. Mention the rules and regulations that you have studied to protect his rights
20. What is RAPD? Give a brief account.
21. What are the different types of restriction enzymes? What is common in the recognition sequence of all organisms which is recognized by restriction enzymes? Explain with an example.
22. What are the basic steps of a polymerase chain reaction (PCR)? Write two applications of PCR.
23. A nanomotor is placed in the body of a patient.:
 - a) What is a nanomotor?
 - b) How does it function?
24. Give a detailed account of Maxam-Gilbert method of DNA sequencing.
25. What do you know about DNA profiling (fingerprinting) and its applications?
26. Write briefly on Human genome project. What benefit one may expect from genome sequencing projects?

Section EAnswer any *one***(Essay type question; each question carries a weightage of 4)**

27. Describe the various gene transfer techniques in plants.
28. Comment on the applications of Nanotechnology in life sciences.
29. Give an account of recombinant DNA technology.

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CORE-4

4B04PLS/BOT- THE ORIGIN OF LIVING THINGS- BIOMOLECULES AND CELL BIOLOGY

Time: 3 Hours

Total Weightage: 30

Section - A

Answer *All*

(Questions in bunches of four; each bunch carries a weightage of 1)

1. Choose the correct answer

- i) Which of the following shows the correct hierarchy in the molecular organization of cells
 a) Metabolic inter mediates-Building blocks-Macro molecules-Supra molecular assemblies
 b) Organelles--Building blocks- Macro molecules-Precursors from the environment
 c) Precursors from the environment- Metabolic inter mediates-- Macro molecules-Building blocks
 d) Building blocks- Macro molecules-Precursors from the environment-Supra molecular assemblies
- ii) No cell is known to be without
 a) Mitochondria b) Chloroplast c) A well defined nucleus d) Ribosome
- iii) The size of Mitochondria is
 a) 5 - 20 μ , b) 50 -100 μ c) 0.5 – 1.0 μ d) 150-300 μ
- iv) Which structure alone cannot be observed with light microscopy?
 a) Vacuole b) Microfilament c) Cell wall d) Plastid

2. State true or false

- i) Klinefilters syndrome is due to the addition of one extra chromosome to the normal cell.
 ii) Sucrose is not a reducing sugar
 iii) Cellulose and amylase are made up of glucose monomers
 iv) Ribosome is a non-membrane organelle:

3. Fill in the blanks

- i) The number of chromosomes in *Drosophila melanogaster* is -----
 ii) When there are $2n+2$ chromosome in a cell, the condition is known as -----
 iii) Bond angle of H-O-H is ----
 iv) The glycosidic bond involved in the branch point of amylopectin is.....

4. Select from column B to match column A and C

A	B	C
i) polysaccharide	carbon, hydrogen, oxygen as enzymes, hormones, pigments	nucleotide
ii) fat	carbon, hydrogen, oxygen, nitrogen, phosphorous directs protein synthesis	amino acid

iii)	protein	carbon, hydrogen, oxygen in a 1:2:1 format immediate source of chemical energy	glucose
iv)	nucleic acid	hydrogen, oxygen, carbon, nitrogen, occasionally sulfur comprise parts of membranes, reserve source of chemical energy	glycerol

5. Answer in one word or in one sentence

- i) Atmosphere of early earth
- ii) The cytoskeleton of a cell.
- iii) Phospholipid.
- iv) Most diverse molecule in the cell

Section B**Distinguish between (any four; Each question carries a weightage of 1)**

- 6 NAD and FAD
- 7 Reducing and Non reducing sugar
- 8 Sphingo lipids and phospho lipids
- 9 Paracentric and pericentric inversion
- 10 Primary and secondary cell walls.
- 11 Eukaryotic and prokaryotic cell.

Section C**(Short answer questions. Answer any Five; each question carries a weightage of 1)**

12. Describe the general structure of a nucleotide
13. What are terpenes chemically, and how are they synthesized? Give one example each of mono- and triterpenes that serve as feeding deterrents to insects.
14. Classify amino acids based on polarity
15. Living things are composed of lifeless molecules. But they show extraordinary attributes not shown by inanimate matter. Comment on the molecular logic of the living state.
16. For a species with a diploid number of 18, indicate how many chromosomes will be present in the somatic nuclei of individuals who are haploid, triploid, tetraploid, trisomic and monosomic
17. What are the basic points of A.I. Oparin's idea concerning the origin of the Universe/Solar System?
18. Give an account of the organisation of interphase nucleus

Section D**Short answer questions. Answer any Six; each question carries a weightage of 2.**

19. Compare and contrast the particulars of the early earth and the current earth with respect to the types of molecules that were prevalent. Why is early earth sometimes described as a "nitrogenous or primordial soup." List two experiments to show that life could have originated from inorganic components
20. Draw the metaphase and anaphase stages of mitosis of a species with the data given below. $2n = 6$, in which one pair of chromosome is metacentric, one pair telocentric and one pair submetacentric. The A, B and C loci each segregating a dominant and recessive allele (A and a, B and b, C and c) are each located on different chromosome pairs.

21. Draw a diagram of a higher plant chloroplast labeling the inner and outer envelope membranes, the thylakoid membranes, the stroma and the grana stacks. Indicate which membranes contain proteins of the photosynthetic electron transport chain and proteins associated with ATP synthesis.
22. Explain the morphology and chemical organization of chromosome.
23. Mitosis is the mere separation of an already duplicated cell. Evaluate the statement.
24. Discuss the main functions of secondary metabolites in plants and relate these functions to the sites of accumulation of secondary compounds in the plant.
25. Draw and label a diagram of a biological membrane which illustrates the fluid mosaic model of membrane structure. Clearly indicate the phospholipids, the hydrophilic head groups, the lipophilic tails, intrinsic proteins, extrinsic proteins, attached carbohydrate moieties.
26. Describe the structure and functions of ribosome. Compare the components of ribosome in prokaryotes and Eukaryotes.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Distinguish between the primary, secondary and tertiary structure of protein.
Discuss the role of bonds in stabilising protein structure
28. Outline the ultrastructure of cell wall. How can you distinguish between the major components of plant cell walls: cellulose microfibrils, pectins, and hemicelluloses? Give examples of the types of molecules that make up each of these major structural components, and how they are arranged in the cell wall. Cite three distinct functions of plant cell walls
29. Give an account of the origin and evolution of biomolecules, cells and the early life

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KANNUR UNIVERSITY EXAMINATION**Plant Science/Botany -Theory Model Question Paper****CORE – 5****5B05BOT/PLS- ENERGY AND INTERMEDIARY METABOLISM****Time: 3 Hours****Weightage: 30****Section A**Answer *All***(Questions in bunches of four; Each bunch carries a weightage of 1)****1. Choose the Correct Answer**

- i) The conversion of pyruvate to oxalo acetate is likely to require which of the following co-enzymes?
a) Biotin b) Vit B12 c) Thiamine pyrophosphate d) Pyridoxal phosphate
- ii) Redox potential value (E_0) of NAD/NADH system is
a) -0.1V b) +0.1V c) -0.32V d) +0.32V
- iii) Which of the following is not a component of mitochondrial electron transport?
a) Ubiquinone b) Cytochrome b_6 c) Cytochrome c d) cytochrome a_3
- iv) In photosynthesis, dark reaction or Blackman's reaction is
a) Enzymatic and occur in the absence of light
b) Non Enzymatic and occur in the absence of light
c) Enzymatic and independent of light
d) Enzymatic and occur in the presence of light

2. State true or false

- i) The synthesis of glucose from lactate or glycerol is called glycolysis
- ii) Phaeophytin is a chlorophyll in which central Mg atom is replaced by hydrogen
- iii) Assimilation of nitrogen by plants is exclusively by ammonia.
- iv) Light reaction takes place during day time and dark reaction in night

3 Fill in the blanks

- i) Photorespiration is otherwise called as c2 cycle because-----
- ii) RUBISCO is-----
- iii) Initial acceptor of carbon dioxide in CAM cycle is-----
- iv) The glycosidic bond involved in the branch point of amylopectin is-

4. The following are Nobel prize winners in photosynthetic research .Rearrange column B and C to match column A.

i)	Total synthesis of chlorophyll	Melvin Calvin	1978
ii)	Elucidation of enzymatic mechanism underlying the synthesis of adenosine triphosphate (ATP).	Paul D. Boyer and John E. Walker	1965
iii)	Oxidative and photosynthetic phosphorylation: chemi-osmotic theory	Robert Burns Woodward	1997
iv)	Carbon-di oxide assimilation in photosynthesis	Peter Mitchell.	1961

5. Answer in one word or in one sentence

- i) The oxidation of a molecule of palmitic acid.
- ii)The Km Value of an enzyme
- iii)Co enzymes
- iv) The emission of phosphorescent radiation

Section -B

Answer any *Four*

(Differentiate the following: Each question carries a weightage of 1)

6. Photophosphorylation and Oxidative Phosphorylation
7. Light reaction and Dark reaction.
8. Reductive amination and Transamination
9. Symbiotic and asymbiotic nitrogen fixation
10. Rate of photosynthesis in intermittent light and continuous light.
11. Competitive and non competitive inhibitors.

Section C

(Short answer questions. Answer any *five*; each question carries a weightage of 1)

12. What are terpenes chemically, and how are they synthesized? Give one example each of mono- and triterpenes that serve as feeding deterrents to insects.
13. Trace out the pathway by which Calvin explored the path of carbon in photosynthesis.
14. Comment on the amphibolic nature of citric acid cycle.
15. The net equation for oxidative phosphorylation can be written as

$$2\text{NADH} + 2\text{H}^+ + \text{O}_2 \longrightarrow 2\text{H}_2\text{O} + 2\text{NAD}$$
 Write an analogous equation for the light reactions of photosynthesis .
16. Write on the role of ATP in biological reactions.
17. What is GS/GOGAT pathway?
18. Write a note on the regulation of citric acid cycle

Section D

Short answer questions. Answer any *six*; each question carries a weightage of 2.

19. Sachs found that the leaves lose more weight during night when they are attached to the plant than they are excised. Why?
20. What is β oxidation? Elucidate β oxidation of fatty acid.
21. What is an action spectrum? What is the relationship between the action spectrum for

- photosynthesis and the absorption spectrum of chlorophyll?
22. Discuss the main functions of secondary metabolites in plants and relate these functions to the sites of accumulation of secondary compounds in the plant
 23. Summarise chemi osmotic coupling theory.
 24. What is phosphorescence? Trace the Photochemistry and transfer of excitation energy in photosynthesis.
 25. Explain the biochemistry of nitrogen fixation.
 26. Give an account of the carbon dioxide fixation in succulent species.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Explain the process of root nodule formation in leguminous plants infected by Rhizobium. Give a detail account of the biochemistry of nitrogen fixation.
28. Describe the different steps whereby a molecule of glucose is oxidized to CO₂ in glycolysis and the citric acid cycle. In what steps is CO₂ released, and in what steps is energy conserved?
29. Give a detailed account of enzyme classification

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KANNUR UNIVERSITY EXAMINATION
Theory Model Question Paper

Core-6-

5B06 PLS/ BOT - GENETICS AND MOLECULAR BIOLOGY

Time: 3 Hours

Total Weightage: 30

Draw diagrams wherever necessary

Section - A

Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct Answer

- i) Which of the following statements defines a gene most precisely?
 a) A gene is a fragment of DNA that codes for the production of a phenotypic trait
 b) A gene is a fragment of DNA that codes for the production of a polypeptide or polynucleotide
 c) A gene is a fragment of DNA that codes for the production of a protein.
 d) A gene is a fragment of DNA that comprises a unit of inheritance
- ii) 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
- iii) The first event in the translation is the binding of the mRNA leader to the
 a) Smaller ribosomal subunit b) Larger ribosomal subunit
 c) Polysomal core d) tRNA
- iv) Which is the correct sequence according to the increasing molecular weight?
 a) tRNA → DNA → rRNA b) rRNA → DNA → tRNA
 c) DNA → rRNA → tRNA d) tRNA → rRNA → DNA

2. State true or false

- Semi conservative mode of replication of DNA was proved by Watson and Crick
- RNA polymerase and DNA polymerase are required for DNA replication
- Sister chromatids separate and segregate to opposite poles during Meiosis-1
- Maize has 10 pairs of chromosomes. Linkage group present in it are 20

3. Fill in the blanks

- i) An intercalating dye used to detect nucleic acid when viewed under uv light is-----
 ii) The term to define gene as a unit of genetic function, a region of DNA which encode a specific product is known as-----
 iii) The molecule which bears the anticodon is

iv) Y-linked genes are otherwise called -----

4. Rearrange column B and C to match column A

i)	Co-linearity of genes and enzymes	Barbara Mclintock	1877
		George Beadle	
ii)	Genes	T.H.Morgan	1911
		Gregor Mendel	
iii)	Linkage	Yanofsky	1937
		H.G.Khorana	
iv)	Crossing over	Johannsen	1967
		Griffith	

5. Answer in one word or in one sentence

- i) What would be the frequency of AABB individuals from a mating of two AaBb individuals?
- ii) The events that occur during the first division of meiosis:
- iii) Heritability
- iv) In a collection of gametes from a heterozygote (AaBb), 10 out of 50 are recombinant for the a and b genes. How far apart are genes a and b?

Section B

. Distinguish between any four of the following: (Each carries a weightage of 1)

6. hn RNA and mRNA
7. Wobble hypothesis and Degeneracy of the genetic code
8. Transposons and retrotransposons
9. promoter and termination codon
10. photo reactivation and excision repair
11. Replication and Transcription

Section C

(Short answer questions. Answer any Five; each question carries a weightage of 1)

12. UV light causes thiamine dimerisation. Describe the mechanism, in order of efficiency that can repair the damage. Name the enzymes involved?
13. Determine the sequence of both strands of DNA from which the RNA shown below was transcribed. Indicate the 5' and 3' ends of the DNA with an arrow and show which strand was transcribed?
5' CCAUCAUGACAGACCCUUGCUAACGCA3'
14. A double stranded DNA molecule is 30% adenosine (A)
 - a) what is the complete base composition of this molecule?
 - b) Answer the same question, but assume the molecule is double stranded RNA

15. In the ABO blood system in human beings, alleles I^A and I^B are co dominant and both are dominant to the I allele. In a paternity dispute, a type AB woman claimed that one of four men, each with different blood types, was the father of her type A child. Which of the following could be the blood type of the father of the child on the basis of the evidence given?
- a) Type A b) Type AB c) Type O d) Type B
16. Explain why linkage is a violation of Mendel's law of independent assortment of genes
17. List all enzymes that participate in the transcription and translation process
18. Draw the tautomeric form of adenine and cytosine

Section D

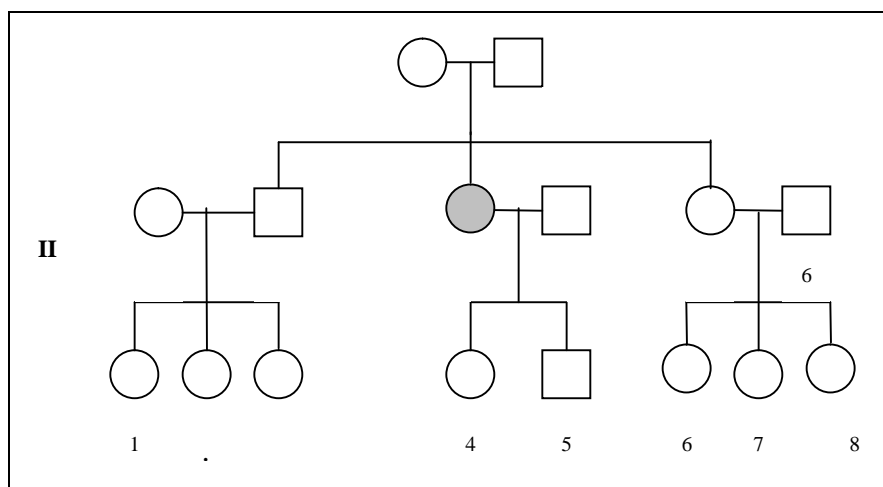
Short answer questions. Answer any Six; each question carries a weightage of 2.

19. In the following pedigree chart what is the probability of the following persons are of genotype Aa?

1 1/11-6

2 1/11-4

3 1/11-8



20. Can two mulattoes have white skinned offspring? Can two white skinned people have dark skinned offspring? Explain.
21. In *Drosophila*, crosses of Dichaete winged flies \times Dichaete always give two thirds Dichaete to one third normal winged offspring. Dichaete \times normal gives one half Dichaete and one half normal. How would you explain these results?
22. Assume that the difference between a type of wheat yielding about 4gm plant and one yielding 10 is due to three equal and cumulative multiple factor pairs, AABBCc, cross one type with the other. What will be the phenotype of the F_1 ; of the F_2 ?
23. Diagram the relationships of the three types of RNA at a ribosome. Which relationships make use of complementarity?
24. In the following problems on blood groups determine the genotypes of the parents?
- a) One parent is group A and the other group B, but all four groups are represented among children.
- b) Both parents are group A, but three fourths of the children belong to group A and one fourth to group B

- c) One parent is AB and the other B, but of the children one fourth A, one fourth AB and one half B
25. Contrast the need for the enzymes involved in the metabolism of lactose and tryptophan in bacteria in the presence and absence of lactose and tryptophan respectively.
26. List the ways in which the behavior of chromosomes during meiosis correlates with the behaviour of genes during gamete formation

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Summarize the central dogma of molecular biology and explain how mutation in DNA can alter a protein.
- 28 How can you distinguish extra chromosomal inheritance from a case of autosomal inheritance and sex linked inheritance? Explain.
- 29 Briefly analyse the important advance in gene theory contributed by each of these groups: Mendelian geneticists, cytogeneticists, one gene one enzyme groups, The DNA structure and replication investigators and the analysers of gene regulation.

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KANNUR UNIVERSITY EXAMINATION
Plant Science/Botany – Theory Model Question Paper

CORE – 7**5B07PLS/ BOT - EVOLUTION, PALAEOLOGY AND PLANT BREEDING****Time: 3 Hours****Total Weightage:30****Section A**Answer *All*

(Questions in bunches of four; Each bunch carries a weightage of 1)

1. Choose the correct answer.

i) Working from deep geologic strata toward shallow geologic strata, what is the sequence in which fossils of these groups should make their first appearance?

1. charophyceans
 2. single-celled green algae
 3. bryophytes
 4. plants with a dominant sporophyte
- a) 3, 1, 2, 4 b) 2, 4, 1, 3 c) 2, 1, 3, 4 d) 1, 3, 2, 4

ii) The following genotypes are found in a population:

BB Bb bb
 70 50 20

What are the allele frequencies of B and b?

- a). B = 0.86 and b = 0.14 b) B = 0.68 and b = 0.32
 c). B = 0.63 and b = 0.36 d). B = 0.32 and b = 0.68

iii) Which concept was not included in Charles Darwin's theory of natural selection?

- a) survival of the fittest b) struggle for existence
 c) overproduction of offspring d) punctuated equilibrium

iv) Which of the following gases was not prevalent in abundance in the atmosphere of early earth, but became more prevalent after living organisms (mostly phototrophs) evolved? _

- a) oxygen b) nitrogen c) methane d) ammonia

2. State true or false.

- i) The theory that evolutionary change is slow and continuous is known as punctuated equilibrium.
- ii). large population size, random mating, no selection, no migration, no mutation are the assumptions of Hardy Weinberg equilibrium.
- iii) Variation within a pureline is heritable.
- iv) Angiosperms are formed during cretaceous period.

3. Fill in the blanks

- i) ----- is considered as the father of paleobotany.
- ii) The theory of chemical origin of life proposed by
- iii) Fossils of leaves are known as
- iv) Polyploidy brings about Speciation.

4. Rearrange column B and C to match A

A	B	C
coenozoic	moss	4500×10^6
mesozoic	algae	370×10^6
palaeozoic	conifers	190×10^6
pre-cambrian	Angiosperms	11×10^6

5. Answer in one word or in one sentence

- i) Heterosis
- ii) Radiocarbon dating
- iii) Genetic drift
- iv) Coenozoic

Section -BAnswer any *Four***(Differentiate the following; Each question carries a weightage of 1)**

- 6. Progressive and Retrogressive evolution
- 7. Broad and narrow heritability
- 8. Micro and macro evolution
- 9. Isogenic lines and Purelines
- 10. Darwinism and Neo Darwinism
- 11. Polyploidy breeding and mutation breeding

Section CAnswer any *Five***(Short answer questions; each question carries a weightage of 1)**

- 12. What is the evidence that life has evolved?
- 13. What are the major mass extinctions, and what are their presumed causes? What is the evidence that extinctions have created opportunities for the survivors?
- 14. In what ways do phyletic gradualism and punctuated equilibrium differ? Is there evidence for either or both of these models of morphological evolution? What could cause a pattern consistent with punctuated equilibrium?
- 15. How is radiometric dating performed to determine the age of rocks? How can this method be used to estimate the age of fossils?
- 16. Briefly describe the bulk method of breeding and its application.
- 17. Give a brief account on functional genomics
- 18. A.I. Oparin is credited with formulating the modern concept on the origin of life. His theory has subsequently been substantiated by scientists Stanley Miller and Sidney Fox. What are the main points in Oparin's theory?

Section DAnswer any *Six***(Short-essay questions; Each question carries a weightage of 2)**

19. What is genetic drift? What is its cause, and how does it affect populations? What are the consequences of genetic drift? What conditions increase the strength of genetic drift? How is an allele's frequency related to the probability of fixation of that allele?
20. Discuss the role of Allopolyploidy in Plant breeding.
21. What were the major evolutionary events of the Precambrian, Cambrian, Ordovician to Devonian, Carboniferous and Permian, Mesozoic, and Cenozoic. When did the Paleozoic begin and end (and with what periods?), when did the Mesozoic end (and with what period?). What was significant about the end of the Paleozoic and Mesozoic?
22. What are the various forms of nonrandom mating? What are their effects on genetic variation in populations? How do positive assortative mating and inbreeding differ? What are the negative consequences of inbreeding?
23. In what ways can speciation occur in the absence of geographic isolation? Why is speciation via hybridization so fast?
24. Differentiate lepidodendron and lepidocarpon
25. What kinds of observations during the voyage of the Beagle led Darwin to the theory of evolution via natural selection
26. Discuss the scope of hybrid varieties in self pollinated crops.

Section EAnswer any **One****(Essay- type questions; Each question carries a weightage of 4)**

27. What is speciation? Outline allopatric, parapatric and Sympatric speciations.
In what way are the various evolutionary forces thought to be involved in the different models of speciation? What kind of evidence supports these models?
28. What is a fossil? What conditions increase the likelihood of fossilization? Briefly describe the method of calculating the age of the fossil. Describe the different types of fossils you have studied.
29. Give a detailed account of origin and evolution of plants

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B.Sc. Botany/Plant Science- Theory Model Question Paper**CORE-13****6B13 BOT/PLS - PLANT FORM AND FUNCTION-2- PLANT PHYSIOLOGY****Time: 3 Hours****Total Weightage: 30****Section A****Answer All****(Questions in bunches of four; Each bunch carries a weightage of 1)****1. Choose the correct answer**

- i) Which of the following GA is immediate precursor of all other GA's in plants
a) GA₁ b) GA₂ c) GA₁₀ d) GA₁₂
- ii) Which of the following elements is essential for the synthesis of chlorophyll?
a) Calcium b) Potassium c) Manganese d) Manganese
- iii) A plant, by opening and closing its stomata, must achieve a balance between
a) Oxygen loss and water uptake b) Carbon dioxide loss and sugar uptake
c) Water loss and carbon dioxide uptake d) Sugar loss and oxygen uptake
- iv) Which of the following is not a specific physiological effect of gibberellin?
a) Elongation of internodes b) Bolting and flowering
c) Synthesis of alpha amylase d) Ripening of fruit

2. State true or false

- i) Seed germination is a phytochrome mediated photoresponse
- ii) Xanthium is a long-day plant
- iii) An essential plant nutrient required for the regulation of stomatal opening and closing is calcium
- iv) Vernalization shortens the vegetative period and hastens flowering

3 Fill in the blanks

- i) Differential distribution of photo assimilates in different sinks of plant is called
- ii) If a cell A has an osmotic pressure of 25 atm and T.P of 15 atm. and cell B has O.P of 30 atm and T.P of 10 atm. Then the net movement of water will occur from
- iii) In rainy season the doors and windows swell up due to-----
- iv) is a deficiency symptom of phosphorus

4. Select from column B to match column A and C

- | | | | |
|------|---------------|--|-----------------------|
| i) | auxin | cell division
Arrest of the cell division | F.W.Went 1928 |
| ii) | gibberellin | Increase in mineral uptake
Anti transpirant | Ohkuma.et.al 1965 |
| iii) | Abscisic acid | Fruit ripening
Elongation of the internode | Skoog and miller 1955 |
| iv) | Cytokinin | Stoppage of guttation
Apical dominance | Sumuki and Yabuta1938 |

5. Answer in one word or in one sentence

- i) Name the amino acid that acts as a precursor for the biosynthesis of IAA.
- ii) Osmotic potential iii) Ethylene iv) Florigen

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

- 6. Active and passive absorption of water
- 7. D.P.D and water potential
- 8. Transpiration and guttation.
- 9. Phototropism and photoperiodism
- 10. Drought stress and salinity stress.
- 11. Nyctinastic and Seismonastic movement
- 16.

Section CAnswer any *Five***(Short answer questions; each question carries a weightage of 1)**

- 12. Define the term "growth" as applied to plants. How can plant growth be measured?
- 13. What is turgor pressure? Can plant cells have negative turgor pressure values? Can you calculate the turgor pressure of a cell from water potential and osmotic potential values?
- 14. Discuss various types of senescence that can occur during plant development." Is senescence synonymous with "necrosis" (death)? Explain your answer.
- 15. Write note on critical photoperiod.
- 16. What are the causes of seed dormancy?
- 17. Evaluate the practical application of vernalisation in a tropical country like India.
- 18. The cell sap of the roots of halophytic plants has normally higher osmotic pressure than that of the cell sap of mesophytic plants. Why?

Section DAnswer any *Six***(Short-essay questions; Each question carries a weightage of 2)**

- 19. Assume that a plant cell with a water potential of -1.0 bar is placed in a beaker containing a sucrose solution that has a water potential of -4.0 bar Further, assume the temperature of the solution is 24 C. Thus:
 - i) The plant cell will become
 - a). larger b.) Smaller c). Not change
 - ii) The weight of the plant cell will
 - :a). increase b). decrease c). not change
 - iii) The concentration of the sucrose solution in the beaker will:
 - a) increase b). decrease c). not change
 - iv) The turgidity of the plant cell will
 - a.) increase b). decrease c). not change

- v) The osmotic potential of the sucrose solution will become
a). more negative b). less negative
- vi) There will be a net movement of water from the
a). cell to the solution b). solution to the cell
- vii) The cell will likely plasmolyse
a). False b) True
20. What is a mineral deficiency? How can a mineral deficiency be recognized? How can farmers benefit from nutrient analysis?
21. Discuss the mechanism of absorption of mineral salts by plants. How does it differ from absorption of water?
22. During the course you might have gone through a number of practical techniques used in the study of whole plant physiology. Discuss any one of these techniques.
- 23 “Explain how light leads to the opening of the stomata on the leaves of higher plants”
24. Describe the theory which you think best explains the mechanism underlying the translocation of organic solute through phloem.
25. How would you proceed to make a water culture? Explain the effects on plant of the omission of the salts of calcium, phosphorus and magnesium respectively?
26. Write an account on ‘The resistance of plants to stress’.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Discuss the movement of water throughout a higher plant
28. What is a phytohormone? How many kinds of them are known to you? Describe at least two phytohormones mentioning its structure, function and synthesis.
29. What is an essential element? How many have been identified? What is the difference between an essential element and a beneficial one? Provide examples of each. Give deficiency symptoms and roles of any three macro elements and one micro element.

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KANNUR UNIVERSITY**B.Sc Botany / Plant Science-Theory Model Question Paper****CORE- 14****6B14BOT/PLS- BIOTECHNOLOGY, NANOBIO TECHNOLOGY AND PLANT
TISSUE CULTURE****Time: 3 Hours****Weightage: 30****Section A**Answer *All***(Questions in bunches of four; Each bunch carries a weightage of 1)****1. Choose the Correct Answer**

- i) M13 is a
- a) Plasmid vector b) cosmid vector c) viral vector d) Phagemid vector
- ii) RFLP analysis is a technique that
- a) uses hybridization to detect specific DNA restriction fragments in genomic DNA
b) is used to determine whether a gene is transcribed in specific cells
c). is used to detect genetic variation at the protein level.
d). is used to amplify genes for producing useful products
- iii) The technique of recombinant DNA was initiated in
- a) 1880s b) 1930s c) 1950s d) 1970s
- iv) What is the function of restriction enzymes?
- a) add new nucleotides to the growing strand of DNA
b) join nucleotides during replication
c) cut nucleic acids at specific sites
d) join nucleotides during transcription

2. State True or False

- i) Human Genome Project was very successful in determining the functions of
over 80% of the genes located in 46 chromosomes
- ii) ϕ x174 has a double stranded RNA
- iii) Cybrids are synonymous to synthetic seeds
- iv) HEPA type of filter is located in Laminar air flow

3. Fill in the blanks

- i) An intercalating dye used to detect nucleic acid when viewed under uv light is-----
- ii) The expansion of PUC vector is-----
- iii) The function of Hup gene in Rhizobium is-----
- iv).....is a cloning vector that can be used to clone large DNA fragments (> 1 MB)

4. Select from column B to match column A and C

	A	B	C
i)	PBR322	Phage replacement vector	48.502kbp
		Phage insertion vector	
ii)	λ gt10	Green fluorescence	6kbp
		Ampicilin resistance	
iii)	pLFR5	Cohen and Boyer	2676bp
		Lac Zgene	
iv)	pUC8	phagemid	4362bp
		cosmid	

5. Answer in one word or in one sentence

- i) Plasmid vectors
- ii) 'Golden rice'
- iii) The "sticky ends"
- iv) Arabidopsis is advantageous for plant genetic research . Why/

Section -BAnswer any *Four***(Differentiate the following: Each question carries a weightage of 1)**

6. PBR322 and PUC
7. Nif gene and nod gene
8. Micro injection and shot gun
9. cDNA library and DNA library.
10. Southern and western blotting
11. Anther culture and protoplast culture

Section C**(Short answer questions. Answer any *five*; each question carries a weightage of 1)**

12. What is the principle of blue-white selection for the presence of recombinant plasmids ?
13. What is a cDNA library ?List two advantages of a cDNA library over a genomic library.
14. What are single nucleotide polymorphisms? With the help of any two examples explain the relevance of studying SNPs.
15. Why are Ti-plasmid based vectors disarmed ? Where is the gene of interest incorporated in this plasmid ?
16. What is a callus and how can callus cultures be maintained for prolonged periods? List two applications of callus cultures.
17. What is meant by the term "totipotent"? Are all plant cells totipotent?
18. What is the advantage of having a poly linker in a cloning vector.

Section D

Short answer questions. Answer any six; each question carries a weightage of 2.

19. Enlist the six major steps in plant tissue culture. Name a medium commonly used for culturing plant parts and what factors dictate the choice of media?
20. a) Why is *Agrobacterium tumefaciens* regarded as nature's genetic engineer?
b) Describe vector-mediated and vector-less gene transfer in plants
21. Explain how adoption of biotechnological process in developed countries can cause economic hardships in developing countries
22. Give an account of the application of nanotechnology in life science.
23. What is the mechanism of gene action of the production of drought resistant plants?
24. What are type II restriction endonucleases (RE) ? Give an example of a type II RE, that generates blunt ends and the sequence recognised by it. Explain how REs are named. Mention two other enzymes and their utility in cloning experiments.
25. Schematically depict the method of recombinant DNA technology and name two methods of introducing recombinant DNA into host cells
26. What is a DNA probe ? Explain the principle of Maxam and Gilberts method of DNA sequencing.

Section E

(Essay type question. Answer any one; each question carries a weightage of 4)

27. Explain the genetics of nitrogen fixation. Give a brief account of regulation of nif gene expression.
28. What are the basic steps of a polymerase chain reaction (PCR)? How can we selectively amplify a DNA fragment ? Write two applications of PCR.
29. Write an account on the biotechnology of photosynthesis

Sd/-

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