Course name: **B.SC (HONS) BOTANY**
Semester: **I**
Unique Paper Code: **32161101_OC**
Paper: **Microbiology and Phycology**
Deptt Code **216**
C. NO: **C1**

Time : 4 hrs (3hrs. for writing + 1 hr for downloading and uploading) **Max. Marks: 75**

Write your University Roll number. Name of the Course, Semester, Paper title, Unique Paper Code, Name of the College, Email ID, Mobile number on first page of the answer sheet.
Attempt any four questions. Attempt all parts of a question together.
All questions carry equal marks (18.75).
Draw suitable well-labeled diagrams wherever required

Q. 1 Discuss the mode of replication in viruses through lytic and lysogenic cycle with the help of diagrams. Compare between the two methods. Describe symptoms, causal organism and control measure of any one viral disease on plants.

Q. 2 Draw the EM of a prokaryotic non-photosynthetic cell and explain its details. Discuss different methods of recombination observed in bacteria with the help of diagrams

Q. 3 Discuss the criteria of classification of algae proposed by F.E. Fritsch and R.E. Lee. List the significant contributions of F.E. Fritsch, G.M. Smith, R.N. Singh, T.V. Desikachary, H.D. Kumar, M.O.P. Iyenger.

Q. 4 Name the algal genus having triphasic life cycle. Discuss the triphasic life cycle with the help of labeled diagrams. Discuss the economic importance of Rhodophyceae.

Q. 5 Discuss the range of thallus organization in members of chlorophyceae with the labeled diagrams. Name the genus associated with macrandrous and nannandrous forms and compare the two forms with the help of suitable diagrams.

Q. 6 Discuss the role of viruses in vaccine production, medicines and diagnostics. Elaborate the role of bacteria and algae in the field of agriculture and industry.

Course name: **B.SC (HONS) BOTANY**
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Attempt any four questions. Attempt all parts of a question together.
All questions carry equal marks (18.75).
Draw suitable well-labeled diagrams wherever required

Q.1 Discuss the role of algae in Industry, Environment Biotechnology and Agriculture.

Q.2 Describe the haplontic, diplontic, haplodiplontic and haplodiplobiontic of life cycles in algae. Give the diagrammatic representation of the life cycle of *Ectocarpus.*

Q.3 Describe the characteristic feature of archaebacteria, eubacteria and wall-less forms (mycoplasma and spheroplasts). Give the diagrammatic representation of the structure of a bacterial cell.

Q.4 With suitable diagrams compare the morphology of *Volvox, Coleochaete and Vaucheria***.** Explain the asexual reproduction of these three genera.

Q.5 Discuss the discovery, physiochemical and biological characteristics of viruses. Write the classification of viruses given by Baltimore.

Q.6 Write the characteristic features of Rhodophyceae. Explain the triphasic life cycle of *Polysiphonia* with the help of diagrams

SET- A

B. Sc. (H) BOTANY / III SEMESTER

PAPER TITLE: ANATOMY OF ANGIOSPERMS

UNIQUE PAER CODE: 32161301

TIME: 3 +1 Hours **Maximum Marks: 75**

(Write your University Roll Number, Paper Title and Code on the top of the Answer Sheet)
Attempt any four questions in all. All questions carry equal marks.

1. What are complex permanent tissues? Describe the structure of the complex tissue involved in conduction of water. Explain briefly the cyto-differentiation of tracheary elements. **18.75**

2. Explain distribution, structure and types of stomata in monocot and dicot leaves. **18.75**

3. What is wood? Discuss different types of wood: Reaction wood, Tension wood, Early and late wood, Heartwood and Sapwood, Porous and Non- porous wood. **18.75**

4. Roots of monocot and dicot plants were mixed in a collection. On the basis of which anatomical characters you would separate them? **18.75**

5. Some plants are evolved to live and survive in abundance of free water. Give a detailed account of anatomical adaptations shown by these plants. Support your answer with any two examples and diagrams. **18.75**

6. Name the process of loss of water in the form of water droplets from margins of some leaves through special pores. Elaborate on the structure and function of these pores. Also, briefly explain structure and function of any other secretory system studied by you. **18.75**

SET- A

Roll No……

S. No. of Question Paper :

Unique Paper Code : **32161302_OC**

Name of the Paper : **Economic Botany**

Name of the Course : **B.Sc. (Hons.) Botany (CBCS)**

Semester : **III**

Duration: **3 + 1 Hours** Maximum Marks: **75**

(Write Your University Roll Number and Paper Title and Unique Paper Code on top of the Answer Sheet) ***Attempt any four questions in all. All questions carry equal marks (i.e. 18.75).***

1. Write the botanical name, family, part used, chemical constituents and uses of fever bark tree and foxglove plants. Give brief account of any two timber yielding plants.

2. Discuss the morphology, processing and uses of cotton. Differentiate between lint and fuzz fibres. Draw labelled diagram of T.S. fennel mericarp.

3. Write the botanical name, family and part used of tea and coffee. Discuss the chemical composition and processing of coffee. Explain the importance of legumes.

4. Give a detailed account of evolution, morphology, post harvest processing and uses of wheat. Briefly discuss curing of tobacco.

5. Describe the processing of cane juice to obtain crystalline sugar and discuss by-products of sugarcane industry. Describe various methods used for tapping of latex from para rubber plant.

6. Write the botanical name, family, economically important plant part and uses of linseed and coconut. Describe briefly various methods used for extraction of essential oils.

SET- A

Roll No……

S. No. of Question Paper :

Unique Paper Code : **32161302**

Name of the Paper : **Economic Botany**

Name of the Course : **B.Sc. (Hons.) Botany (CBCS)**

Semester : **III**

Duration: **3 + 1 Hours** Maximum Marks: **75**

(Write Your University Roll Number and Paper Title and Unique Paper Code on top of the Answer Sheet) ***Attempt any four questions in all. All questions carry equal marks (i.e. 18.75).***

1. Write the botanical name, family, part used, chemical constituents and uses of opium and foxglove plants. Briefly explain various methods used for tapping of latex from para rubber plant.

2. Discuss processing and uses of cotton. Differentiate between white jute and tossa jute. Explain the importance of legumes.

3. Write the botanical name, family, economically important plant part used and chemical constituents in tea and coffee. Give brief account of processing and uses of coffee.

4. Describe the morphology and post-harvest processing of rice. Differentiate between Indica rice and Japonica rice. Briefly discuss any two pseudocereals studied by you.

5. Write the botanical name, family, part used and uses of groundnut and coconut. Differentiate between essential oils and fatty oils. Draw labelled diagram of L.S. Clove.

6. Describe the processing of cane juice and discuss important by-products of sugarcane industry. What is TPS technology? Briefly discuss curing of tobacco.

SET III

LS Semester III (Botany)

Unique Paper Code: 42164301

Paper Title: Plant Anatomy and Embryology

Time: 3 + 1 Hours **Maximum Marks: 75**

(Write your University Roll Number, Paper Title and Unique Paper Code on top of the Answer Sheet)

Attempt any four questions in all. All questions carry equal marks (i.e., 18.75)

Q1. Some plants have built in devices to disseminate their seeds to far off places while others are dependent on external agencies for the same. Explain these mechanisms in detail with examples.

Q2. Discuss the events that lead to the development of a mature female gametophyte in the angiosperms. Explain different types of embryo sac development through diagrams only.

Q3. Which sporophytic layer in the anther contributes to development of pollen wall and its proteins? Explain the different types of this layer and enumerate all its functions.

Q4. Discuss the various adaptations in hydrophytes and xerophytes with help of suitable diagrams and examples.

Q5. Write a note on seasonal activity of cambium. Discuss the secondary growth in dicot stem with illustrations.

Q6. How many types of simple tissues have you studied? List out the differences between each one of them. Support your answer with suitable diagrams

SET C

Unique Paper Code: 32161501_ OC

Name of the Paper: Reproductive Biology of Angiosperms

Name of the Course: B.Sc.(H) Botany

Semester: V

Time: 3+1 Hours **Maximum Marks: 75**

Attempt any four questions in all. All questions carry equal marks. Draw well-labelled diagrams wherever necessary.

Q.1. Elaborate on methods of germline transformation in plants studied by you? Enumerate advantages and disadvantages associated with each method. (18.75)

Q.2. You performed a selfing experiment in flowers of a plant with viable pollen grains and receptive stigma. However, there is no fruit and seed set. What could be the cause of this and possible underlying genetic mechanism? (18.75)

Q. 3. How many types of cells are present in a typical *Polygonum* type of female gametophyte among flowering plants? Name them. Also write a detailed note on ultrastructure of each cell of a female gametophyte along with suitable illustrations. (18.75)

Q.4. Who coined the term 'apomixis' and what does this refer to? Distinguish between sporophytic and gametophytic type of apomixis found in flowering plants. Write a note on each subtype of gametophytic apomixis with suitable examples and diagrams. (18.75)

Q.5. Illustrate the process of formation of male gametes from microspore mother cell. Enlist the different transportation agencies that help in pollination. Discuss anemophily and entomophily with suitable examples and diagrams. (18.75)

Q. 6. Describe the different types of endosperm development found in angiosperms with examples and diagrams. Write the evidences to justify that it provides nutrition to the embryo. (18.75)

Set 'C'

B. Sc. (Hons.) BOTANY/V Sem

Unique Paper Code: 32167502, DSE-2

Paper Title – Biostatistics

Time: 3 + 1 Hours **Maximum Marks: 75**

(Write your University Roll number, Paper Title and Unique Paper Code on top of the answer sheet)

Attempt any four questions in all. All questions carry equal marks.

Q1. Discuss the aim and applications of biostatistics in biological research. Define a sample. What are the different kinds of sampling techniques used in biostatistics? Draw a bar diagram of the following data for 1st and 2nd year botany students in a college

1st Year Botany	Male	448
	Female	390
2nd Year Botany	Male	352
	Female	258

Q2. Discuss different methods of measuring central tendency? Discuss merits and demerits of using median as the measure of central tendency. Calculate the coefficient of variation of the following three sets of data for number of seed per fruit in 10 fruits. Which group has least variation?

Batch I	7	9	6	8	6	5	7	8	6	8
Batch II	10	8	9	10	11	10	5	6	4	7
Batch III	8	6	8	11	10	12	8	7	5	10

Q3. Define correlation and regression. Discuss similarities and dissimilarities between correlation coefficient and regression coefficient. Draw a scatter diagram and calculate the regression coefficient for the following data

Amount of Cd in soil (in mg)	980	1209	1403	1950	1814	1280	1073	1066	880	776
Number of fruits per plant	22	26	8	10	5	19	26	12	23	28

How many fruits are expected in a plant growing in 1100 mg Cadmium?

Q4. What is a null hypothesis and alternate hypothesis? What do mean by the 'level of significance' in hypothesis testing. What is a type I and type II error? Calculate the Student's t test for the following data and comment on it's significance at p=0.05.

Weight of treated plants (in mg)	900	950	2010	1012	1100	930	980	910	-
Weight of untreated plants (in mg)	100	880	640	870	520	590	610	680	610

Q5. What is the significance of using computer-based software's in Biostatistics? Give significant advantages of using R over MS-EXEL. Perform Chi-square test for the data given and discuss if the results of the following dihybrid cross follows Mendel's law of 9:3:3:1.

891=Round and yellow; 316=Wrinkled and yellow; 290=Round and green; 119=Wrinkled and green.

Q6. What are the various sources of data in biostatistics? Differentiate between grouped and ungrouped data. Summarize the raw data for plant height for 30 plants of *Vigna radiata* given below in a frequency distribution table and draw a frequency polygon for the same.

143,138,121,139,133,151,119,133,122,123,136,104,104,137,127,113,99,112,132,90,112, 121,132,126,129,140,126,123,107,134

SET B

S. No. of Question paper	**:**		
Unique paper Code	**:**	**32161502_OC**	
Name of the course	**:**	**B.Sc. (Hons) Botany**	
Name of the paper	**:**	**Plant Physiology**	
Semester	**:**	**V**	
Duration	**:**	**3 Hours+ 1 hour**	**Maximum Marks: 75**

*Attempt any **four** questions. All questions carry equal marks.*

Q 1. How does the most accepted theory explain the water movement from the root to the top of tall trees in the form of a continuous column? What is the structure of aquaporins? Discuss its role in movement of water.

Q2. Differentiate between essential and beneficial elements. Discuss the methods of study and use of the nutrient solutions. What is the criteria used for determining the essentiality of minerals?

Q3. Discuss the role of various pumps and electrochemical gradients in active transport of ions across the cell membrane. Describe the role of siderophores and phytosiderophores in nutrient absorption in plants.

Q4. Which technique was used to analyse the constituents of phloem sap and how does the pressure flow model explain the translocation of solutes?

Q5. Explain the chemical nature, physiological role and commercial applications of auxin.

Q6. What is photoperiodism? Describe three major kinds of photoperiodic responses. Explain the transmissible signal and its long-distance transport as per CO-FT model.

SET A

Unique Paper Code: 32161501

Name of the Paper: Reproductive Biology of Angiosperms

Name of the Course: B.Sc.(H) Botany (LOCF)

Semester: V

Time: 3+1 Hours **Maximum Marks: 75**

Attempt any four questions in all. All questions carry equal marks. Draw well-labelled diagrams wherever necessary.

Q.1. Describe the structure and function of a fully differentiated anther. Draw a well-labelled diagram of transverse section of a mature and un-dehisced tetrasporangiate anther. (18.75)

Q. 2. Define self-incompatibility and what is its biological significance? Differentiate between GSI and SSI. Describe any five methods to overcome self-incompatibility in flowering plants. (18.75)

Q. 3. Define polyembryony and write a note on its classification. What are the causes of polyembryony? Discuss the practical value of polyembryony. (18.75)

Q. 4. Define an ovule. With the help of well-labelled diagrams explain the different types of ovules present among the flowering plants. Differentiate between crassinucellate and tenuinucellate types of ovule.
(18.75)

Q.5. What is seed dispersal? Write its biological significance. Explain the various seed dispersal mechanisms with suitable examples.(18.75)

Q. 6. What is pollen viability? Discuss the different methods of pollen storage and the practical applications of pollen storage. Describe the factors that influence pollen germination and pollen tube growth under *in vitro* conditions.
(18.75)

SET A

BSc. (Hons.) Botany/III Sem
Unique Paper code: 32161303_OC
Paper Name: Genetics

Time: 3+1 Hours **Max Marks: 75**

Attempt any *Four* questions. All questions carry equal marks.

1. Distinguish between monogenic and polygenic inheritance. In a dihybrid cross, two corn plants with green seedlings were crossed and in the F_2 generation, 142 green and 34 purple seedlings were obtained. Find out the probable segregation ratio and also explain the genetic basis of segregation. Write down the genotypes and phenotypes of parents, F_1 and F_2 plants. Briefly explain penetrance and expressivity. **(6+8.75+4)**

2. Describe an experiment performed in Maize that served as an evidence for cytological basis of crossing over**.** Female *Drosophila* heterozygous for three recessive mutations *e* (*ebony* body), *st* (*scarlet* eyes), and *ss* (*spineless* bristles) were testcrossed, and the following progeny were obtained:

Phenotype	**Number**
+ + +	67
e + +	8
e st +	68
e + ss	347
e st ss	78
+ st +	368
+ st ss	10
+ + ss	54

(a) What indicates that the genes are linked? Using proper nomenclature, determine the genotypes of the P_1 and F_1 parents.

(b) Determine the sequence and map distance between the genes.

(c) Calculate the coefficient of coincidence? Does it represent positive or negative interference? Explain its significance. **(6.75+12)**

3. How do induced mutations differ from the spontaneous mutations? Describe the mutagenic effects of Base analogues, UV radiations and Alkylating agents. **(6.75+12)**

4. With the help of labelled diagrams explain the meiotic behaviour of a paracentric inversion heterozygote. How has polyploidy contributed towards evolution of crops? Elaborate with any two suitable examples**.** **(10.75+8)**

5. Discuss inheritance of kappa particles in *Paramecium*. Explain genic balance theory of sex determination in *Drosophila*. **(10+8.75)**

6. How deducing the structure of phage T4 rII locus led Benzer to understand the fine structure of gene? In a population that is in Hardy-Weinberg equilibrium, the frequency of the recessive homozygote genotype of a certain trait is 0.09. Calculate the percentage of individuals homozygous for the dominant allele**.** **(12.75+6)**

SET- A

S. No. of Question paper :

Unique paper code : 32167501

Name of the Paper : Analytical Techniques in Plant Sciences

Name of the Course : B.Sc. (H) Botany: DSE-I

Semester : Vth

Duration: 3 Hours+1hour **Maximum Marks: 75**

(Write Your University Roll Number on top of the Answer Sheet)

Attempt *four* questions in all. All questions carry equal marks.

Attempt all parts of the questions together. Illustrate the answers wherever required.

Q1. What is the significance of the wavelength of illumination source in microscopy? Using Abbe's equation, explain the practical limits of resolution for light and electron microscopy. How the resolution differs from magnification? (3+12.75+3=**18.75** marks)

Q2. Define chromatography. What is principle of chromatography? Name and explain the column chromatography that can be used to separate molecules on the basis of -

i. Charge on the molecule
ii. Specific Biological interactions

(2+6+10.75=**18.75** marks)

Q3. Discuss autoradiography and explain its working. List five radioisotopes and their uses in biological research. Explain pulse-chase experiment with the help of a classic experiment that employed this technique. (4+5+9.75=**18.75** marks)

Q4. Explain the principle, working and application of Mass Spectrometry with the help of diagram? Write an account on MALDI-TOF MS. (10.75+ 8= **18.75 Marks**)

Q5. Explain the principle of centrifugation. Describe the steps involved in the differential centrifugation technique for isolating subcellular particles and mention the applications of the technique. Comment upon the marker enzymes for identifying constituents fractions with examples. (5+8+5.75=**18.75 marks**)

Q6. Describe fluorescence microscopy with the help of ray diagram. Give an account of fluorescent probes/dyes that are used in the techniques. Write its applications.

(10+5.75+3=**18.75 marks**)

SET- C

S. No. of Question paper :

Unique paper code : 32167503

Name of the Paper : Analytical Techniques in Plant Sciences

Name of the Course : B.Sc. (H) Botany: DSE-I

Semester : V

Duration: 3 Hours+ 1hour **Maximum Marks: 75**

(Write Your University Roll Number on top of the Answer Sheet)

Attempt *four* questions in all. All questions carry equal marks.

Attempt all parts of the questions together. Illustrate the answers wherever required

Q1. Explain the basic principle of microscopy. Using ray diagram explain the principle and working of phase contrast microscopy. Enumerate its advantages over conventional light microscopy. (5+10.75+3=**18.75**)

Q2. Explain the principle, working and applications of Southern Blotting. How is it different from Northern and Western blotting? (12.75+6=**18.75**)

Q3. Explain the principle of chromatography. What is solvent front and retention factor in chromatography? Explain what does it mean when retention factor is one or zero. Write down the principle, application and limitations of Thin Layer Chromatography.
(5+2+2+9.75=**18.75**)

Q4. What are radioisotopes? Give an account of different types of radiations emitted by radioisotopes. List the uses of radioisotopes in biological research. Briefly explain autoradiography. (2+6+4+6.75=**18.75**)

Q5. What do you understand by chromosome banding? Give a detailed account of its types. Add a note on how chromosome painting is different from chromosome banding.
(3+12.75+3=**18.75**)

Q6. Explain centrifugation with its principle. Describe different types of centrifugation techniques. Comment on the role of marker enzymes in this technique.
(4+9.75+ 5=**18.75**)

SET- A

Plant Physiology and Metabolism/III Sem
(BHGE5)
Generic Elective Unique Paper Code: 32165301_OC

Time: 3 + 1 hrs **Max. Marks: 75**

(Write Your University Roll No, Paper Title and Paper Code on top of the Answer Sheets)

Attempt FOUR questions in all.

All questions carry equal marks (18.75)

1. Explain the most accepted theory for the ascent of sap in plants. Differentiate between transpiration and guttation. Discuss various factors that affect the rate of transpiration.

2. Describe the pressure flow hypothesis for the transport of sugars with a well labelled diagram. Write details of the girdling experiment and its significance. Explain the role of channels and carrier proteins in transport of ion across the membrane.

3. Write a brief note on the discovery of Auxin. Describe the physiological role of Auxin and Abscisic Acid. Discuss the photo-reversible nature of phytochrome.

4. Discuss symbiotic nitrogen fixation with reference to nodulation and the role of Dinitrogenase and leghaemoglobin. Explain transamination with one example. Differentiate between competitive and non-competitive enzyme inhibition.

5. Discuss three phases of the Calvin cycle. Write the reactions where ATP and NADPH are utilized in dark reactions. Differentiate between C4 and CAM pathway. Briefly discuss photorespiration and its significance.

6. Give a detailed account of Glycolysis with a flow chart. Discuss the fate of the end product under anaerobic conditions. Briefly discuss oxidative pentose phosphate pathway and its significance.

SET- A

Plant Physiology and Metabolism/III Sem
(BHGE5)
Generic Elective Unique Paper Code: 32165301

Time: 3 + 1 hrs **Max. Marks: 75**

(Write Your University Roll No, Paper Title and Paper Code on top of the Answer Sheets)

Attempt FOUR questions in all.

All questions carry equal marks (18.75)

1.What is the criteria of essentiality of an element? Differentiate between macro and micro nutrients. Discuss the role of Phosphorus, Potassium, Zinc and Calcium in plant nutrition. Explain cohesion-tension theory for ascent of sap.

2.Write detailed note on the discovery of Auxin. Describe physiological roles and commercial applications of auxin and ethylene. Explain the role of Gibberellic Acid in seed germination.

3. Discuss the mechanism of action of enzymes. Explain irreversible and reversible enzyme inhibition. Discuss the role of Nitrate reductase and Nitrite reductase in Nitrogen metabolism.

4. Give evidence in support of role of phloem in sugar transport. List the substances transported in phloem. Explain the pressure flow hypothesis for long distance transport of photo-assimilates.

5. Give schematic representation of Kreb's Cycle (TCA). Tabulate the products of one round of TCA. Which step is associated with substrate level phosphorylation? Briefly discuss Glyoxylate cycle and its significance.

6. Illustrate Z scheme and explain the role of reaction center chlorophyll molecule, PSI and PSII in photosynthesis. Differentiate between cyclic and non-cyclic ETC during photosynthesis.

OR

Give an account of the discovery and structure of Phytochrome. Enlist the phytochrome mediated physiological processes. Describe the photo reversibility nature of phytochromes.

SET-C

Unique Paper code	**:**	**32163302**
Name of the Paper	**:**	**Intellectual Property Rights (SEC)**
Name of the Course	**:**	**B.Sc. (H) Botany**
		Skill Enhancement Course
Semester	**:**	**III**
Maximum Marks	**:**	38
Time	:	3 hrs. (2 hrs. for writing +1 hr. for downloading and uploading)

Instructions for Candidates

1. Write your **University Roll number, Name of the Course, Semester, Paper Title, Unique Paper Code, Name of the College, Email ID, mobile number on the first page of the answer sheet.**
2. Attempt any **four** questions.
3. All questions carry equal marks (9.5 marks).

1. Describe the different types of Trademarks with the help of examples. Discuss the conditions for trademark registration. Differentiate between Infringement and Passing off.

2. List the types of work protected under Copyright Act. How copyright is transferred in India? Discuss types of copyright infringement and its remedies available under law.

3. Explain the PPVFR Act, 2001 in detail and emphasize on rights of farmers under this Act. Explain the protection available for Geographical Indications in India.

4. Differentiate between Bio-Prospecting and Bio-Piracy. Discuss protection of Traditional Knowledge on the International Arena. How is Traditional Knowledge protected in India?

5. How Computer Software, Databases and Semiconductor chips are protected in India? Discuss moral issues in patenting biotech inventions.

6. Describe the procedure of obtaining patents in India. Explain the basic criteria of patentability. What is an Industrial design and how it can be registered in India?