

03 JAN 2023

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Deccan Education Society's
FERGUSON COLLEGE (Autonomous) Pune-4
 Affiliated to Savitribai Phule Pune University
M.Sc.-I (Semester : I)
Subject: Botany
Paper Title: Plant Physiology & Biochemistry
Paper Code: BOT4102
2019 Pattern (4 Credits)

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) Classify carbohydrates in different classes. 2M
 - b) What is beta-oxidation? Write its physiological significance 3M
 - c) Develop biosynthetic pathway for pyrimidines 4M
- Q2) **Answer the following questions** **9M**
- a) "C4 & CAM plants are more energy efficient than C3" Express your view. 2M
 - b) How does regulation of Calvin cycle take place? 3M
 - c) Write a report on ATP synthase 4M
- Q3) **Answer the following questions** **9M**
- a) Compare carriers & channels in ion transport 2M
 - b) Emphasize the properties of xylem in water transport 3M
 - c) Describe allosteric regulation of enzymes with suitable example 4M
- Q4) **Answer the following questions** **9M**
- a) Predict the physiological consequences if short day plants are given flash of light during night 2M
 - b) What are tropic & nastic movements? Explain with example 3M
 - c) Deduce MM equation & LB equation and give significance of K_m 4M
- OR**
- a) Assess commercial uses of gibberellins 2M
 - b) Draw and label the structure of nitrogenase enzyme complex 3M
 - c) Write note on circadian rhythms 4M
- Q5) **Answer the following questions** **(Any 2)** **10M**
- a) Evaluate the physiological roles of ABA 5M
 - b) Draw and label mevalonate pathway 5M
 - c) Integrate comparative account of C4 pathways 5M
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) Elaborate the role of salicylate & jasmonate during stress 4M
 - b) Represent the biosynthetic pathway for branched chain amino acids. 4M

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FERGUSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University

M.Sc.-II (Semester : IV)

Subject: Botany

Paper Title: Biostatistics and Bioinformatics 2019 Pattern (4 Credits)

Paper Code: BOT5401

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.
- 4) Use of scientific, non-programmable calculators and statistical tables is permitted.

Q1) Answer the following questions **9M**

- a) A pair of variables has Karl Pearson's correlation coefficient value of 0.95. What would you tell about the correlations between the two variables? 2M
- b) What are measures of dispersion? State why are they necessary to adequately describe the data? 3M
- c) Outline the Derived Databases. 4M

Q2) Answer the following questions **9M**

- a) Write applications of molecular phylogenetics. 2M
- b) Summarize fasta file in short. 3M
- c) Discuss completely randomized design of experiment. 4M

Q3) Answer the following questions **9 M**

- a) Where would you apply the chi square test? 2M
- b) How is Null Hypothesis implemented? 3M
- c) What are the types of errors in statistics? Outline the ways in which Type I error could be reduced. 4M

Q4) Answer the following questions **9M**

- a) What is sampling? 2M
- b) Calculate median for following data: 3M

Marks	5	10	15	20	25	30	35	40	45	50
No. of students	20	43	75	76	72	45	39	9	8	6

- c) Data on waxy endospermic plants was recorded in maize. Calculate standard deviation: 4M

X	7	8	9	10	11	12
f	13	13	18	17	15	14

OR

- a) Emphasize the importance of bootstrap value in phylogenetic tree. 2M
- b) Explain the meanings of the terms homology, identity & similarity. 3M
- c) Briefly describe the maximum parsimony approach of building a phylogenetic tree. 4M

Q5)

Answer the following questions**(Any 2)****10M**

- a) Calculate Karl-Pearson's coefficient of skewness for data given below:

5M

Spike length (cm)	14-15	15-16	16-17	17-18	18-19	19-20	20-21	21-22
No. of plants	35	40	48	100	125	87	43	22

- b) In an experiment of the salt tolerance of wheat, following data was recorded after treating the seeds with different salinity levels. The data was recorded in 5 replicates on the number of roots per plant. State whether the different salinity levels have any effect on the mean number of roots. Use Tukey's test for pairwise comparison.

5M

Replicates	Control	Salinity level 1	Salinity level 2	Salinity level 3
1	5	6	7	10
2	5	6	6	6
3	6	7	9	9
4	4	6	8	8
5	4	7	7	9

- c) Write comparative account of NCBI & EMBL.

5M

Q6)

Answer the following questions**(Any 1)****4M**

- a) A farmer applied three types of fertilizers on 4 plots. The yield in tons/ Acre is given. Test the hypothesis that type of fertilizer influences the yield at 0.01 level of significance.

4M

	A	B	C	D
Nitrogen	6	4	8	6
Potash	7	6	6	9
Phosphorus	8	5	10	9

- b) Compare BLAST & CLUSTAL methods of sequence alignment

4M

04 JAN 2023

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Deccan Education Society's
FERGUSSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University
M.Sc.-I (Semester : I)
Subject: Botany
Paper Title: Genetics and Evolution
Paper Code: BOT4103
2019 Pattern (4 Credits)

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) Define quantitative inheritance with two examples 2M
 - b) Describe the significance of back cross and test cross in Genetics. 3M
 - c) Outline cytoplasmic inheritance in Iojob plants of *Zea mays*. 4M
- Q2) **Answer the following questions** **9 M**
- a) Give implications of Hardy- Weinberg's law. 2M
 - b) Draw neat labelled diagram of Miller's experiment. 3M
 - c) Explain recessive epistasis. 4M
- Q3) **Answer the following questions** **9 M**
- a) What are multiple alleles? 2M
 - b) Classify inversion in chromosome. 3M
 - c) Differentiate between lytic and lysogenic cycles. 4M
- Q4) **Answer the following questions** **9M**
- a) Compare somatic and autosomal mutations and give examples. 2M
 - b) How is Lod score calculated for linkage testing? 3M
 - c) Determine the mapping of bacterial genome by interrupted mating. 4M
- OR**
- a) Give the role of colchicine in polyploidy. 2M
 - b) Write a short note on High frequency recombination strains of bacteria. 3M
 - c) Explain the CIB method for detection of sex linked lethal mutation. 4M
- Q5) **Answer the following questions** **(Any 2)** **10 M**
- a) How is tetrad of ordered spores in *Neurospora* analyzed for mapping? 5M
 - b) Assess the concept of sexual selection using appropriate example. 5M
 - c) Elaborate coacervate concept of evolution. 5M
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) Discuss mutation theory proposed by De Vries. 4M
 - b) Comment on evolution of proteins. 4M

12 DEC 2022

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Deccan Education Society's
FERGUSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University
M.Sc.-II (Semester : III)
Subject: Botany
Paper Title: Plant Biotechnology
Paper Code: BOT5302
2019 Pattern (4 Credits)

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) Mention any two methods of probe labelling **2M**
 - b) What are SNPs? Write their applications. **3M**
 - c) Contrast the process and use of RFLP and RAPD markers **4M**
- Q2) **Answer the following questions** **9 M**
- a) Define "insertional Mutagenesis" **2M**
 - b) Describe the method of SAGE. **3M**
 - c) Write comparative account of antisense technology & RNA interference **4M**
- Q3) **Answer the following questions** **9 M**
- a) What is cryopreservation? **2M**
 - b) Mention the role of PGRs in PTC **3M**
 - c) Write a note on "Somatic Embryogenesis" **4M**
- Q4) **Answer the following questions** **9M**
- a) Why are meristems free of viruses? **2M**
 - b) How are molecular markers used for phylogenetic analysis? **3M**
 - c) Illustrate the method of One Lane DNA Sequencing **4M**
- OR**
- a) Enlist applications of somaclonal variation technique. **2M**
 - b) Discuss use of differential display technique to study gene expression **3M**
 - c) Derive the steps in technique of TILLING **4M**
- Q5) **Answer the following questions** **(Any 2)** **10 M**
- a) Explain strategies related to PDR approach in development of virus resistance **5M**
 - b) Write a note on "Plant Derived vaccines" **5M**
 - c) Enlist the names & roles of any five genes for salt stress resistance. **5M**
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) What are plantibodies? Write about their applications **4M**
 - b) Justify the advantages of Tissue culture technique over conventional methods. **4M**

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Deccan Education Society's
FERGUSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University
M.Sc.-II (Semester : III)
Subject: Botany
Paper Title: Plant Ecology
Paper Code: BOT5303
2019 Pattern (4 Credits)

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) Define gross primary productivity and net primary productivity. 2M
 - b) Which groups of organisms get priority for conservation? 3M
 - c) Outline the methods of in situ conservation. 4M
- Q2) **Answer the following questions** **9 M**
- a) Clarify the concept of metapopulation. 2M
 - b) What is PAN? How is it produced? Write its effects. 3M
 - c) Explain journey of xerosere to climax community. 4M
- Q3) **Answer the following questions** **9 M**
- a) What is Quorum sensing? 2M
 - b) Predict zonation of lentic fresh water ecosystem. 3M
 - c) Comment on Tundra biome wrt geography, climate, flora and fauna 4M
- Q4) **Answer the following questions** **9M**
- a) Enlist different trapping mechanisms in plants with suitable examples. 2M
 - b) Distinguish between holoparasites and hemiparasites. 3M
 - c) Review life history strategies in population. 4M
- OR**
- a) Assess role of allelochemicals in plants. 2M
 - b) Justify: Rhizobia exhibit mutualistic association with legumes. 3M
 - c) Explain trapping mechanism in *Dionaea*. 4M
- Q5) **Answer the following questions** **(Any 2)** **10M**
- a) Evaluate the plant adaptations for protection against strong light. 5M
 - b) Conclude the reasons of soil pollution. 5M
 - c) What are the major drives of biodiversity changes? 5M
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) Propose the effects of topographic factors on plant distribution. 4M
 - b) Comment on Man and Biosphere Programme. 4M

Deccan Education Society's
FERGUSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University
M.Sc.-I (Semester : I)
Subject: Botany
Paper Title: Fundamental Botany I
Paper Code: BOT4101
2019 Pattern (4 Credits)

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02 JAN 2023

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) Enlist the characters used for algal classification. 2M
 - b) Recall general characters of Bryophytes. 3M
 - c) Outline diversity of mushrooms 4M
- Q2) **Answer the following questions** **9 M**
- a) Clarify the need of bioprospecting of fungi. 2M
 - b) Justify: BGA members are associated to other groups symbiotically 3M
 - c) Assess the role of mycorrhiza in agriculture. 4M
- Q3) **Answer the following questions** **9 M**
- a) Draw a well labelled diagram of sporophyte of Bauxbaumiales. 2M
 - b) Predict the thallus organization of Chytridiomycota. 3M
 - c) Organize the process of evolution of sexual reproduction of Chlorophyta. 4M
- Q4) **Answer the following questions** **9M**
- a) Distinguish between Euglenophyta and Chrysophyta 2M
 - b) Identify the ecological importance of Bryophytes. 3M
 - c) Explain thallus organization of Ascomycota. 4M
- OR**
- a) Compare the sporophyte of Anthocerotales and Notothyladales. 2M
 - b) Analyse the importance of Rhodophyta in industry. 3M
 - c) Give salient features of Blastocladiomycota. 4M
- Q5) **Answer the following questions** **(Any 2)** **10 M**
- a) Evaluate diversity of thallus anatomy across Marchantiales. 5M
 - b) Review the range of thallus of Phaeophyta. 5M
 - c) How is Microsporidia different than all other groups of fungi? 5M
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) Compile morphological and anatomical characters of Polytrichales. 4M
 - b) Comment on range of thallus of Xanthophyta. 4M

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Deccan Education Society's
FERGUSON COLLEGE (Autonomous) Pune-4
Affiliated to Savitribai Phule Pune University
M.Sc.-II (Semester : III)
Subject: Botany
Paper Title: Plant Systematics and Developmental Botany
Paper Code: BOT5301
2019 Pattern (4 Credits)

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) Define Determination with suitable diagram. **2M**
 - b) Draw well labelled diagram of organization of RAM. **3M**
 - c) Discuss Conventional Tools in Taxonomy. **4M**
- Q2) **Answer the following questions** **9 M**
- a) Outline the role of phytochromes in plant development. **2M**
 - b) Trace Development of carpel with flow diagram **3M**
 - c) Describe important Rules of the ICN. **4M**
- Q3) **Answer the following questions** **9 M**
- a) Give two examples of cell-cell interaction. **2M**
 - b) Interpret the role of tapetum in microsporogenesis. **3M**
 - c) Give an outline of Artificial system of Classification. **4M**
- Q4) **Answer the following questions** **9M**
- a) What is Holotype? **2M**
 - b) Discuss Modern tools used in Taxonomy. **3M**
 - c) Elaborate Apical basal patterning with the help of 4 genes. **4M**
- OR**
- a) Distinguish between GSI and SSI **2M**
 - b) Relate functioning of any three genes with shoot development in *Arabidopsis*. **3M**
 - c) Write a note on Classification and Identification of Plants. **4M**
- Q5) **Answer the following questions** **(Any 2)** **10M**
- a) Write Systematic position of Moraceae and its economic importance. **5M**
 - b) Discuss ABC model of flowering in *Arabidopsis*. **5M**
 - c) Explain signaling and gene regulation by cytokinin. **5M**
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) Write ultrastructural, Cytological, Physiological and Cytochemical changes during transition from vegetative to reproductive shoot. **4M**
 - b) Note the morphological differences in Convolvulaceae and Tiliaceae s.s. **4M**

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Deccan Education Society's
FERGUSON COLLEGE (Autonomous) Pune-4
 Affiliated to Savitribai Phule Pune University
M.Sc.-II (Semester : III)
Subject: Botany
Paper Title: Industrial Botany
Paper Code: BOT5305
2019 Pattern (4 Credits)

[Time: 3 Hours]

[Max. Marks : 50]

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Neat diagrams must be drawn wherever necessary.
- 3) Figures to the right side indicate full marks.

- Q1) **Answer the following questions** **9M**
- a) List types of biopesticides 2M
 - b) What are mycoproteins? List their advantages. 3M
 - c) How is biodiesel manufactured from algae? State advantages of algal biodiesel. 4M
- Q2) **Answer the following questions** **9 M**
- a) Outline the process of large scale production of yeast biomass. 2M
 - b) Give applications of micropropagation. 3M
 - c) Explain with suitable examples the post-harvest processing of greenhouse crops/products. 4M
- Q3) **Answer the following questions** **9 M**
- a) Describe the use of biotransformation for improving secondary metabolite production with suitable example. 2M
 - b) What are abiotic elicitors? Predict their mode of elicitation 3M
 - c) Write a note on screening procedures for selecting high secondary metabolites producing cell lines. 4M
- Q4) **Answer the following questions** **9M**
- a) How can the vase life of rose flowers be prolonged? 2M
 - b) Would the open-field or greenhouse production of Gerbera be better in your locality? Justify your choice. 3M
 - c) Which avenues would you explore to become an entrepreneur in the cut flower industry? 4M

OR

- a) List the orchids propagated as floriculture crops. 2M
 - b) Which factors are considered before packaging the cut flowers? 3M
 - c) Which quality benchmarks would you set for your Gerbera cut flowers? 4M
- Q5) **Answer the following questions** **(Any 2)** **10 M**
- a) Explain sea weed cultivation using any one example. 5M
 - b) Review mode of action of Azadiractin. 5M
 - c) Describe how you will set up and maintain a mushroom production unit. 5M
- Q6) **Answer the following questions** **(Any 1)** **4M**
- a) What is timber? Describe the properties of any one timber you have studied. 4M
 - b) Explain the role and uses of Trichoderma as insecticide and biofertilizer 4M