

BOTANY HONS. QUES. PAPERS (PART - I, II & III) - 2017

PART - I

FIRST PAPER - 2017

Full Marks - 100

Module - I

1. Answer the following questions :

- (a) What is flagellar root? 2
- (b) What are trumpet hyphae? 2
- (c) Name one coralline alga. 1
- (d) What are viroids? How do they differ from virus? 2
- (e) Mention the uses and source of dextran. 2
- (f) What are fermicutes? 1

2. (a) Comment on the ultrastructure of algal plastids. 5

Or, Describe the role of algae as biofertilizers. Name one alga producing β - carotene. 4+1

(b) Briefly outline the methods of transmission of plant viruses. 5

Or, Give an outline of industrial production of streptomycin. 5

3. (a) Describe the frustule structure of diatoms. Write a note on auxospore formation in Pennate diatoms with suitable illustrations. What is diatomin? 5+8+2

Or, What do you mean by triphasic life cycle? Give one example. Enumerate the different stages of the life cycle with diagrams and mention the ploidy level with significance. 2+1+12

(b) (i) What is competence? State the process of natural competence in bacteria. 2+5

(ii) Write the basic differences between $F^+ \times F^-$ and $Hfr \times F^-$ conjugation in bacteria. 5

(iii) What do you mean by chromosome mobilization? 3

Or, (i) Give an account of structural features of TMV. Discuss the role of microbes in the production of biopesticides. 5+5

(ii) Enumerate the structure and function of bacterial endospore. 5

Module – II

4. Answer the following questions :
- (a) What is VAM? Give one example. 2
- (b) What is Buller phenomenon? 2
- (c) Name the fungus used in commercial production of Riboflavin. 1
- (d) What is polyetic disease? Give one example. 2
- (e) Give an example of biotroph. 1
- (f) Name one pathogen which causes hypertrophy and hyperplasia. 2
- Write the name of the disease it causes. 2
5. (a) Write a note on industrial production of cheese. 5
- Or,** Enumerate the various forms of thallus structures in lichen. 5
- (b) Define pathotoxin. Write the characteristic features of pathotoxins with example. 5
- Or,** Role of Koch's postulates in plant disease diagnosis. 5
6. (a) (i) Describe the stages of parasexuality. State its importance. 5+2+2
- How does sexual cycle differs from parasexual cycle. 5
- (ii) Comment on types of aflatoxins and their biological activity. 6
- Or,** (i) What do you mean by accessory spore? Write a brief account of accessory spores of fungi. 2+7
- (ii) Briefly outline the industrial production of ethanol. 6
- (b) (i) What is plant disease management? Describe the chemical methods of plant disease management with examples. 2+8
- (ii) Write a concise account of induced systemic resistance in plants. 5
- Or,** Describe the symptoms, disease cycle and control measures of Stem rot of Jute. Name the causal organism. 4+6+4+ 1

SECOND PAPER – 2017

(Group - A)

Full Marks - 50

1. Answer the following questions briefly :
- (a) State the amphibian nature of bryophyte. 2
- (b) Distinguish between apophysis and operculum. 2
- (c) Name an aquatic bryophyte. 1

Third Paper – 2017

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- (d) What is duripartic preservation? 2
- (e) Mention the NPC number of monoporate pollen grain. 2
- (f) Name the index fossil of Indian Middle Gondwana. 1
2. Give a brief account of morpho-anatomical features of gametophytes in different groups of bryophytes. Comment on the sporophytic structure of *Anthoceros*. 10+5
- Or,** Write short notes on the following :
- (a) Algal origin of bryophytes 5
- (b) Homologous theory of alternation of generations 5
- (c) Role of bryophytes in pollution monitoring. 5
3. Briefly describe the conditions governing fossilization process. State the principles followed for the nomenclature and reconstruction of fossil plants. 5+5+5
- Or,** Write notes on the following :
- (a) Pollen aperture types 5
- (b) Outlines of Geological Time Scale 5
- (c) Melissopalynology and its significance. 5
4. Write briefly on **any two** of the following: 5×2
- (a) Pollen germination and pollen tube growth (b) Double fertilization and its significance (c) Embryogenesis in *Capsella* (d) Types of polyembryony.

PART – II

THIRD PAPER – 2017

Full Marks - 100

Module - V

(Marks - 50)

1. Answer the following questions :
- (a) What is incipient heterospory ? 2
- (b) Distinguish between sorus and synangium. 2
- (c) State the morphological nature of elaters of *Equisetum* spore. 1
- (d) Mention two diagnostic characters of Progymnospermophyta. 2
- (e) What is interseminal scale? Where is it found? 2
- (f) Name the plant yielding Canada Balsam. 1
2. (a) Discuss the adaptive changes during colonization of early land plants. 5

Or, Describe the structure of a prothallus of *Dryopteris* with suitable diagram. 5

(b) Characterise the male fructification of *Gnetum* with suitable illustrations. 5

Or, Draw and describe the structure of female gametophyte of *Cycas*. 5

3. (a) Name the different form genera of a reconstructed lycopod studied by you. Mention its geological age of occurrence and geographical distribution. Describe the leaf cushion, stem anatomy and strobilus of the genus with suitable diagrams. 2+2+3+5+3

Or, Define 'telome' and 'rnesome.' Characterise the different 'elementary processes' associated with 'Telorne theory'. Explain, the origin of fertile structures in Psilophyta and Sphenophyta using the relevant elementary processes with suitable diagrams. 2+5+4+4

(b) Describe the stem anatomy of *Pinus* with diagrams. How does it differ from that in *Cycas*? Explain with diagrams, the different types of polyembryony found in *Pinus*. Comment on the interaction of algae/fungi with the roots of *Cycas* and *Pinus*. 5+2+6+2

Or, Name the different organ genera of the reconstructed plant *Lyginopteris*. Describe the stem anatomy, pollen bearing organs and seeds with suitable diagrams. Mention its geological age and geographical distribution. 2+4+3+4+2

Module – VI

(Marks – 50)

4. Answer the following questions briefly :
- Distinguish between autogenic and allogenic succession. 2
 - What is cryopreservation? 2
 - Define ecocline. 1
 - Distinguish between apoplast and symplast. 2
 - Distinguish between paracytic and diacytic stomata with labeled diagrams. 2
 - What is plastochron? 1
5. (a) Explain the different types of photoremediation with examples. 5
- Or, Give an idea of 'Age and Area' hypothesis of endemism. 5
- (b) State the adaptive anatomical features in xerophytes. 5
- Or, Describe the structure and functions of plasmodesmata. 5

6. (a) Define ecological succession. Describe the various seral stages of a hydrosere. Explain with examples the concept of ecotone and edge effect. 2+8+5

Or, (a) Comment on the dominant flora of Eastern Himalaya. 5

(b) Enumerate the phytogeographical regions of India as proposed by D. Chatterjee (1960). 5

(c) Write a brief note on the role of GIS and remote sensing in the study of plant community. 5

(b) Define stele. Give an account of different types of steles found in plants with illustrations and examples. Add a note on the origin of pith in siphono stele. 2 + 10 + 3

Or, Write short notes on :

(a) 'Korper-Kappe' theory of root apical organisation. (b) Anomalous secondary growth in *Dracaena* stem. (c) Types of thickening in plant cell wall. 5+5+5

FOURTH PAPER – 2017

(Group – A)

Full Marks – 50

1. Answer the following questions :
- What is apocary? Give an example. 1+1
 - Define diplostemonous stamens with one example. 1+1
 - With one example explain basionym. 2
 - What is bracketed key? 1
 - Define synapomorphy. 1
 - Name the largest herbarium of India and state its acronym. 1+1
2. Answer *any two* of the following :
- Describe different types of dry dehiscent fruits with one example to each. 5
 - With suitable diagrams, describe capitulum and umbel inflorescences with one example to each. 2½+2½
 - Define placentation. Describe any two types of placentations with diagrams and one example to each. 1+2+2
 - With one example to each, describe different types of aestivations. 5

3. Distinguish between phenetic and phylogenetic system of classification. Give an outline of Cronquist's (1988) system of classification up to sub-classes. Mention the merits of this system.

4+8+3

Or, (a) Distinguish between garden and botanical garden. Describe briefly, the role of herbaria in botanical studies.

2+3

(b) What is author citation? Explain the author citations using 'ex' and 'in'.

1+2+2

(c) What is effective publication? Mention the four conditions for valid publication of a name of a taxon.

5

4. Describe the floral morphology of Poaceae. Write the salient features of the sub-families of Leguminosae. State the plesiomorphic characters of a monocotyledonous family studied by you. Mention briefly, the economic importance of the family Liliaceae.

4+6+3+2

Or, (a) Name any four phytochemicals used in taxonomic studies. State briefly, any one role of anatomy in solving taxonomic problem(s).

2+3

(b) What do you mean by polyphyletic and paraphyletic group? State any two principles of ICN.

2+1½+1½

(c) Mention the families in which the following characters are found and state their diagnostic features:

½+½+2+2

(i) Interpetiolar Stipules (ii) Retinacula.

PART – III

FIFTH PAPER – 2017

Full Marks – 100

Group – A

1. Answer the following in few words :

(a) What is Emerson effect? 1

(b) How heat-shock proteins protect the plants during high temperature stress? 2

(c) Write down the structure of IAA. 2

(d) What is embolism? Does it affect water transport in plants? 2

(e) What is vernalisation? Mention its significance. 2

(f) How you can induce "Zero-turgor" in plant cell artificially? 1

2. Answer *any two* of the following :

(a) Describe the role of blue light in stomatal movement. 5

(b) Briefly describe the biochemical reactions involved in the conversion of pyruvic acid to acetyl CoA. 5

(c) Describe the mechanism of translocation through phloem with special reference to pressure flow hypothesis. 5

(d) Give an account of physico-chemical nature of phytochrome. 5

3. Answer *any two* of the following :

(a) What is the difference between dormancy and quiescence? Discuss different methods of breaking seed dormancy. Briefly describe the biochemical changes associated with the process of seed germination. 4+5+6

(b) What are the sites of the primary and secondary carboxylation reactions in C_4 plants? In schematic form enumerate the variations in the mechanism of decarboxylation in C_4 plants with examples. "The C_4 pathway is more expensive than C_3 pathway regarding energy consumption" — Justify. Why CAM plants are called night C_4 plants? 2+8+3+2

(c) Distinguish between symbiotic and non-symbiotic nitrogen-fixation. Describe the biochemistry of nitrogen-fixation with special reference to the role of nitrogenase and leghaemoglobin. 4+(6+5)

(d) Give answers of the following :

(i) Describe in brief the role of ethylene in fruit ripening. (ii) Point out the role of cytokinin in plant senescence. (iii) Mention the physiological roles of polyamines as plant growth regulator. 5+5+5

Group – B

4. Answer the following in few words :

(a) What are oligosaccharides? Give examples. 2

(b) What is buffer? Name two major buffering components. 2

(c) Two samples of protein have identical composition of amino acids but still they are different. — Explain. 2

(d) Distinguish between lyase and hydrolase type of enzymes. 2

(e) Why pH 7 is considered as neutral pH. 1

(f) What is proenzyme? 1

5. Answer *any two* of the following :

(a) What is redox potential? Explain it with the help of electro-chemical gradient. 2+3

- (b) What relationship exists between K_m and $[S]$ when an enzyme catalyzed reaction proceeds at $80\% V_{max}$? 5
- (c) What is G-protein? Mention its role in signal transduction pathway. 2+3
- (d) "A molecule of reduced NAD yields 2.5 molecules of ATP while that of reduced FAD yields only 1.5 molecules of ATP" — Explain. 5

6. Answer **any one** of the following :

- (a) What is lipid? Why are membrane lipids called amphipathic molecules? Distinguish between simple lipid and compound lipid. With examples define saturated and unsaturated fatty acids. 1+2+7+5
- (b) Distinguish between nucleotide and nucleoside with structure. Mention two examples of nucleotide derivatives. Present a comparative account of B and Z form of DNA. Give a brief account of non-genetic RNA. 3+2+5+5

7. Mention the source plants, parts used and uses of the following pharmacologically active constituents : Digitoxin, Vinblastin, Gingerol, Quinine, Catechin. 3×5

Or, Write short notes on : 5×3

- (a) Importance of alkaloids in the defence of plants against pathogenic microbes and herbivores. (b) Organoleptic and biological evaluation of drugs. (c) Classification of drugs on the basis of chemical constituents and therapeutic effects with examples.

SIXTH PAPER – 2017

Full Marks - 100

Module - XI

(50 Marks)

1. Answer the following questions :
- (a) Name one gene present in cpDNA and in mt DNA. 1
- (b) What is ribozyme? Give one example. 2
- (c) What is MPF? Mention its function. 2
- (d) Distinguish between symmetric and asymmetric karyotype. 2
- (e) What is Student's 't' test? Give formula. 2
- (f) Mention two types of DNA markers used in molecular breeding. 1

2. How is the spindle apparatus formed during cell division? Illustrate the dynamics of chromosome movement during anaphase with reference to anaphase Promoting Complex (APC). Why are the chromosome termini not digested by exonuclease activity? 5+8+2
- Or, Write short notes of the following: 5×3

(a) Structure and function of nuclear pore complex. (b) Ribosome biogenesis. (c) Origin of eukaryotic cell.

3. Answer **any two** of the following :

- (a) What do you mean by 'cms'? — Explain. Why male sterile lines are important in plant breeding? 2+3
- (b) What is back cross method? How will you transfer a dominant gene into a high yielding variety? 2+3
- (c) Explain Hardy-Weinberg genetic equilibrium and mention the factors affecting it. 5

(d) The grain length of a variety of rice is given below :

Grain length (mm)	9-11	12-14	15-17	18-20
No. of grains	3	5	9	3

Calculate the mean and standard error of mean of grain length of the variety. 2+3

4. With suitable flow charts illustrate the steps for anther culture and pollen culture techniques. Which one is more advantageous and why? Discuss the importance of haploid culture. $(4 \times 2) + 2 + 5$

Or, Answer the following : 5×3

- (a) Essential components of plant tissue culture medium. (b) Artificial seed production and its significance. (c) Mention the achievements of transgenic plant production.

Module – XII

(50 Marks)

5. Answer the following questions :
- (a) Write down the gametes from AaBbCc. 1
- (b) Give an example of a type of gene interaction that can modify the Mendelian Dihybrid Ratio. 2
- (c) A plant has a chromosome number $2n = 14$. What is its linkage group? 1
- (d) Explain "Wobble Hypothesis" with a suitable example. 2

(e) What are the differences between reciprocal translocation and crossing over? 2

(f) What is split gene? 2

6. Discuss in brief **any two** of the following: 5×2

(a) Explain the ABC model of flower development in *Arabidopsis*.

(b) Write down the process of PCR and its two applications. (c) Write a short note on one gene— one polypeptide concept. (d) “Crossing over involves a physical exchange between segments of homologous chromosomes during meiosis”— How was this hypothesis experimentally proved in maize?

7. Answer **any two** of the following :

(a) What is an operon? Distinguish between inducible and repressible operon. Explain the mechanism of positive and negative control in *lac* operon with suitable diagram. 2+3+10

(b) Enumerate briefly the roles of different enzymes in DNA replication. Describe the mechanism of origin of transcription of RNA in prokaryotes. Give a brief idea of RNA processing in Eukaryotes. 7+3+5

(c) What do you mean by transition and transversion? Discuss the molecular mechanism of the following mutagens in causing mutation :

(i) UV rays, (ii) 5-BU, (iii) HNO_2 , (iv) EMS 3+(3×4)

(d) A cross is made between a heterozygote YDE/yde and a recessive yde/yde. Progenies were analysed and following results were obtained :

Phenotype	Genotype	Number
1. Yellow, dry, elongated	YDE	358
2. Purple, juicy, round	yde	346
3. Yellow, dry, round	YDe	44
4. Purple, juicy, elongated	ydE	44
5. Yellow, juicy, round	Yde	104
6. Purple, dry, elongated	yDE	92
7. Yellow, juicy, elongated	YdE	8
2. Purple, dry, round	yDe	4

(i) Determine the gene order and map distance between the genes.

(ii) Find out the co-efficient of co-incidence and interference.

(2+10)+(2+1)