# 2018

## M.Sc. 4th Semester Examination

## BOTANY

**PAPER—BOT-402**

**Subject Code—23**

*Full Marks* : 40

*Time* : 2 Hours

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Illustrate the answers wherever necessary.*

**Special Paper : *Angiosperm Taxonomy and Molecular Systematics***

***[Angiosperm Taxonomy]***

**1.** Answer any *five* of the following : 2×5

(a) What is vegetation and flora ? Give an example.

(b) What is crypic species ? Give an example.

(c) Define homoplasy. Give an example.

(d) What is primitive and basal angiosperms ? Give an example.

(e) Define paraphyly and polyphyly. Give an example.

(f) What is the full form of IUCN and UNEP ?

(g) What are dicots and eudicots ? Give an example.

(h) Name two natural dye yielding plants with their family.

**2.** Write the differences on any *two* of the following : 5×2

(a) Plesiomorphy & Apomorphy ;

(b) Convergent & Divergent evolution ;

(c) Angiosperms & Mesangiosperms ;

(d) True mangrove & Mangrove associated.

**3.** Answer any *two* of the following : 10×2

(a) What is phylogenetic classification ? What is the full form of APG system ? Mention the outline of this classification and indicate the merits and demerits of this system. What is the basic differences between APG-I and APG-II ?

1+1+3+2+3

(b) Define biodiversity. Who first coined this terms ? Mention its importance. What are the differences between $\alpha$, $\beta$ & $\omega$ diversity ? What is megadiversity centre ?

2+1+3+3+1

(c) What is chemosystematics ? What are the macro and micro molecules in chemosystematics ? Who first classified it ? Mention the importance of proteins and flovnoides in solving taxonomic problems.

2+2+1+3+2

(d) Define phytogeography or botanical zones. Who first classified phytogeographic zones in India based on plant vegetation ? Mention in details of this classification with the help of suitable map dominating plants, rainfall and temperatures. 2+1+7

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**Special Paper : *Cytogenetics & Biotechnology***

***[Cytogenetics]***

**1.** Answer any *five* of the following : 2×5

(a) State the basic construction of microfilament.

(b) Highlight the basic differences between the polytene and lampbrush chromosomes.

(c) Which key role is played by anaphase promoting complex in eukaryotic cell cycle ?

(d) What is population bottleneck ? State its genetic significance.

(e) What is Balbiani ring ? How is it related to the puffs of lamp brush cromosome ?

(f) What is meant by continuous variation ?

(g) Enumerate four features of B chromosomes.

**2.** Answer any *two* of the following : 5×2

(a) Explain sympatric speciation. Comment on the impact of founder effect on peripetric speciation. 3+2

(b) Illustrate narrow sense heritability contrasting with the broad sense heritability. 3+2

(c) Describe microtubules and mention their arrangement in flagella and its basal part. 3+2

(d) Write down the different methods of molecular transport across the cell membrane. What is the speciality of aquaporins ? 3+2

**3.** Answer any *two* of the following : 10×2

(a) Illustrate the Hardy-Weinberg principle explaining equilibrium with its equation. 5+5

(b) What are the cell cycle check points ? State their respective significance. Mention the role of $p^{53}$. 2+5+3

(c) How does cyclin concentration affect MPF activity ? What is MTOC ? Point out the role of GTP during assembly of microtubule. 4+2+4

(d) What are intermediate filements ? Write a note on the different types of it. Mention the roles of these filaments. 2+6+2

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**Special Paper : *Ecology and Biodiversity***

***[Ecology]***

1. Write short notes any *five* of the following : 2×5

(a) Deep ecology ;

(b) Food web ;

(c) Montreat Protocol ;

(d) Biological invasion ;

(e) *EI Nino* ;

(f) Sustainable Development ;

(g) London smog ;

(h) Frequency and Abundance.

2. Comment on any *two* of the following : 5×2

(a) Global warming ;

(b) Ozone Hole ;

(c) Rachel carson ;

(d) Bhopal Disaster.

3. Answer any *two* questions : 10×2

(a) Define stress. Classify the commonly prevalent environmental stresses. Write the biochemical adaptation of plants to waterlogying. 2+4+4

(b) Characterise population. Comment on r-strategy and k-strategy. 4+(3+3)

(c) Define phytoremediation. Discuss the various processes (techniques) used to clean-up contaminated environments. 3+7

(d) Define mangroves. Write the functional significance of Sundarban mangroves. 3+7

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**Special Paper : *Microbiology***

***[Microbiology : Basic]***

1. Answer any *five* questions : 2×5

(a) Write down two unique properties of mycoplasma.

(b) What is semisynthetic penicillin ? Name one such antibiotic.

(c) What is c-DNA library ?

(d) Name each of a purple and green sulfer bacteria.

(e) Mention two unique properties of $M_{13}$.

(f) What is acid fast staining ?

(g) What is quorum sensing ?

(h) Distinguish between batch culture and continuous culture.

2. Answer any *two* questions : 5×2

(a) Write down different mechanisms of antibiotic resistance developed in bacteria. 5

(b) Discuss mechanism of action of topoisomerase and methylase. $2\frac{1}{2}+2\frac{1}{2}$

(c) Mention the techniques for isolation and purification of viruses. $2\frac{1}{2}+2\frac{1}{2}$

(d) Discuss with diagram about different parts of a SEM. 5

3. Answer any *two* questions : 10×2

(a) How animal viruses are cultivated in the laboratory ? Mention application of genetic engineering in agriculture and medicine. $5+2\frac{1}{2}+2\frac{1}{2}$

(b) Write down the process of infection and nodule formation in leguminous plants by Rhizobium. Discuss the structure of nitrogenase found in Azotobactor. 5+5

(c) (i) Define oncogenes. Mention their role for causing cancer.

(ii) Mention critically the role of plasmid in cloning technology. 5+5

(d) How oxygenic photosynthesis differ from anoxygenic photosynthesis ? Compare mechanism of electron flow in purple and green sulfur bacteria. Why chemolithotrophic bacteria oxidize inorganic compounds. 3+4+3

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**Special Paper : *Mycology & Plant Pathology***

***[Mycology]***

**1.** Answer any *five* of the following : 2×5

(a) What is siderophore ?

(b) Define heterokaryosis. Where does it occur ?

(c) In which year and from which organism was penicillin first isolated ?

(d) What is Buller Phenomenon ?

(e) Name the source and target of strobilurin.

(f) What is ang-kak ?

(g) Who first identified fungal fumaric acid production and in which year ?

(h) Name the sources of malic and succinic acid.

2. Write notes on any *two* : 5×2

(a) Nutrient sensing by fungi ;

(b) Significance and modes of formation of heterokaryosis ;

(c) Cephalosporins ;

(d) Spindle pole bodies.

3. Answer any *two* of the following : 10×2

(a) What do you know about production of griseofulvin and cyclosporin ? 5+5

(b) State the importance of lactic and oxalic acid. 5+5

(c) What do you know about production of gluconic and itaconic acids by fungi ? 5+5

(d) Discuss briefly the role of free radicals behind the human ailments and mushroom as a source of antioxidant. 10

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**Special Paper : *Palaeobotany, Palynology and Plant Reproductive Biology***

***[Palaeobotany]***

1. Answer any *five* of the following : 2×5

(a) What is aesthenosphere ?

(b) What is meant by erosin of rocks ?

(c) How does pebble differ from cobble ?

(d) What is meant by Formation ?

(e) What is meant by organic sapropel ?

(f) Name two important magafloral elements of Parsora formation.

(g) What is anthracite ?

(h) What is meant by continental drift ?

**2.** Answer any *two* of the following : 5×2

(a) Write about different diastrophic changes that occur in sedimentary rocks. 5

(b) Discuss about the forces which are responsible for movements of lithospheric plates. Write down the effects of these plates movement. 3+2

(c) Discuss about the megafloristics of Rajmahal formation. Mention the age and area of occurence of the plant fossils. 3+1+1

(d) Discuss the method of dating of rock samples using carbon as an element. 5

**3.** Answer any *two* of the following : 10×2

(a) Classify precambrian into different eras. Discuss the different life-forms which are met with during Precambrian. 2+8

(b) What is meant by Indian Gondwana ? Write the basis of two fold classification of Indian Gondwana. Describe the miofloristics of lower Gondwana in Damodar valley basin. 1+2+7

(c) Discuss the Triassic floras of Molteno and Chinle formations. 5+5

(d) Discuss the role of palaeobotany in relation to palaeoclimatology. 10

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**Special Paper : *Plant Physiology, Biochemistry and Molecular Biology***

***[Plant Physiology]***

1. Answer any *five* of the following : 2×5

(a) What are ephemeral plants ?

(b) What is the product of noncyclic photophosphorylation ?

(c) What is ABC model in respect of flowering ?

(d) Write the major function of leghaemoglobin.

(e) What is the consequences of chilling injury ?

(f) What is antigibberallin ?

(g) What specific function is played-by PEP-carboxylase ?

(h) Name two plant growth regulators associated with plant defense.

**2.** Write short notes on any *two* of the following : 5×2

(a) Coupled co-transport ;

(b) ATP generation mechanism in chloroplast ;

(c) Role of PGR in plant senescence ;

(d) Molecular biology of PCD.

**3.** Answer any *two* from the following questions : 10×2

(a) Enumerate the structure and function of nitrate assimilating enzyme. Briefly describe the genes involved in nitrate assimilation. 5+5

(b) Briefly describe the molecular mechanism for polar transport of auxin. Write a short note on current models of IAA induced $H^+$ extrusion. 5+5

(c) Describe the two major classes of membrane transport proteins. Write a note on the mechanism of action of $Na^+$–$K^+$ pump. 4+6

(d) Enumerate the major biochemical changes associated with abiotic stress. 4+6

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