2008

M.Sc. Part–II Examination

BOTANY

PAPER—X

Full Marks : 100

Time : 4 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.

Write the answer to questions of each Group in separate books.

Environmental Botany

Group — A [Marks : 20]

Answer any *two* questions of the following.

1. Answer briefly the following questions (any *five*) : 2×5

(a) Distinguish between stress and strain.

(b) Write down the full forms of NAR and CGR.

(c) What is your concept on floral stimulus ?

(d) What is capillary water of soil ?

(e) Distinguish between growth and development of plants.

(f) Write down a biochemical test for expeditious determination of seed viability.

(g) Define water deficit stress. Mention one important biochemical index of stress.

2. Classify heat shock proteins (HSPs). Write down in brief the mechanisms of overcoming environmental stress in plants. Mention two major biochemical changes associated with stress in higher plants. 3+5+2

3. What is meant by critical day length in relation to flowering? Write a brief note on the role of phytochrome in flowering. How are plants classified on the basis of their photoperiodic responses? 2+6+2

4. Define sandy, silty and clayey solids mentioning the range of particle sizes of each soil type. Enumerate the important chemical properties of soil. What do you mean by soil horizon? 3+5+2

Group — B [Marks : 20]

Answer any *two* questions.

5. (a) What are different strategies adopted by the microbes to develop antibiotic resistance? Describe any one strategy. 3+2

   (b) What are biofilms? What is aerated pile composting? 1+1

   (c) Write down the ecological impact of nutrient overload. 3

6. What are the causes of insecticide resistance? Differentiate between penetration resistance and metabolic resistance. How are GM crops made resistance against pests? 2+4+4

7. (a) Mention the microbial composition of hydrothermal vents. 2

   (b) Elucidate the role of microbes in iron leaching? What is the significance of this microbial involvement in metallurgy? 4+4

8. (a) Indicate the role of methanogen and methanotrophs in the carbon cycle.

   (b) Outline the method of suspended cell sewage treatment.

(c) Name two peptide biopesticides.

(d) Write down the role of *Azola* as a biofertilizer. 3+3+2+2

Group — C [Marks : 20]

Answer any *two* questions.

9. (i) Explain how deforestation results into forest degradation leading towards desertification.

(ii) What is the productivity of the forests of India ? What are the reasons of decline in productivity ? 6+4

10. (i) Give an outline of the approach to conservation of Biodiversity.

(ii) Discuss the principles of the Management of National Park. 5+5

11. Write short notes on any *two* of the following : 5+5

(i) Conflicts in Wildlife management ;

(ii) Plantation technique in desert areas ;

(iii) Wildlife management and protected area network ;

(iv) Forest Policy.

Group — D [Marks : 40]

Answer *Q. No. 12* and any *two* from the rest.

12. Answer short notes on the following (any *five*) : 2×5

(i) Deep ecology ;

(ii) Grassland ;

(iii) Ecological pyramid ;

(iv) Greenhouse gases ;

(v) Bhopal gas disaster ;

(vi) Montreal protocol ;

(vii) *In-situ* conservation ;

(viii) Mutagenic pollutant.

13. Define mangrove. Write the ecological values of mangroves. 2+13

14. Define ozone hole. Discuss the environmental factors (agents) responsible for ozone hole formation. Write briefly the harmful effects of ozone depletion on human health. 2+5+8

15. Classify environmental pollutants on the basis of their mode of action. Discuss harmful effects of pesticides and heavy metals on in human health. 5+(5+5)

Ecology and Taxonomy

Group — A [*Ecology*]

Answer *Q. No. 1* and any *two* from the rest.

1. (a) Define the following (any *four*) : 2×4

(i) Food chain ;

(ii) Bhopal gas tragedy ;

(iii) Greenhouse effect ;

(iv) Biodiversity ;

(v) Environmental stress ;

(vi) Deforestation.

(b) Comment on the following (any *four*) : 3×4

(i) Niche ;

(ii) Ramsar site ;

(iii) Forest fire ;

(iv) Neurotoxic pollutants ;

(v) Biosphere Reserve ;

(vi) Environmental disaster.

2. Define mangrove. Discuss the ecological roles of mangroves. 3+12

3. Define ozone hole. Mention the environmental factors (agents) responsible for ozone hole formation. Discuss the adverse impact of ozone depletion on human health. 2+5+8

4. What is phytoremediation? Mention the different processes involved in phytoremediation. Discuss the role of phytoremediation in environmental purification. 2+5+8

5. Mention the main branches of ecology. What do you mean by ecosystem? Describe the structure and function of aquatic ecosystem. 2+3+10

Group — B [*Taxonomy*]

Answer *Q. No. 6* and any *two* from the rest.

6. (a) Answer any *six* of the following : 2×6
   (i) What is Flora?
   (ii) What do you mean by desert vegetation?
   (iii) What is megadiversity centre?
   (iv) Name two hotspots from India.
   (v) Name the largest herb from abroad.
   (vi) What is antigen?
   (vii) What are Eudicots?
   (viii) What is *Nomen nudum*?
   (ix) Name two medicinal angiospermic plants from eastern Himalaya.
   (x) Name two endangered insectivorous plants from India.

   (b) Distinguish between (any *two*) of the following : 4×2
   (i) SEM & TEM ;
   (ii) Coastal and Estuarine habitats ;
   (iii) Minor and Major phytochemical characters ;
   (iv) <1000 and >1000 MW ;
   (v) Monograph and Revision.

7. Write salient features of the subclass Rosidae. Mention the putative relationships among the orders. Mention briefly, the important characters of Commelinidae. 6+6+3

8. What is phylocode ? What are the basic differences between ICBN and PCBN ? What are the principles of phylocode ? Mention its merits and demerits. 2+4+3+6

9. What do you mean by Palynotaxonomy ? Who did () 'NPC' system ? Represent this 'NPC' system of classification of pollen grains with the help of suitable diagrams. Discuss the roll of palynology in taxonomy giving three examples. 2+1+6+6

10. What are parasite plants ? Describe the adaptative features, distribution and phylogenetic relationships of parasitic plants with examples. Distinguish between holoparasite and hemiparasite. 2+10+3

Cytogenetic and Molecular Biology

Answer *Q. No. 1* and any *five* from the rest.

1. Answer any *ten* of the following : 2×10
   (a) What is inbreeding depression ?
   (b) What are VNTRs ? Mention any utility of them.
   (c) Name the constituents of ribosomes. Which constituent does carry the catalytic function ?
   (d) What is meant by exon shuffling ? Give an example.
   (e) What is a polylinker site in a genetic vector ? What is the significance of it ?
   (f) Define shuttle vector. What is the utility of it ?
   (g) What is C value ? What will be the value for a diploid species after S phase ? — 2C or 4C ?
   (h) Define heterochromatin in terms of stainability and sequence peculiarity.

(i) Write the equation for measuring broad sense heritability. At which point does it differ from narrow sense heritability ?

(j) What is nucleosomal positioning ?

(k) Define a palindrome sequence. Give an example mentioning its usefulness.

(l) What are cyclins ? State their functions.

(m) How does nonrandom mating change the genetic status of a population in absence of any other factor ?

(n) Enlist the objectives for which you would adopt protoplast culture.

(o) Characterize the lipid present in plasma membrane. Give one example of its variation.

(p) How does an enhancer sequence differ from promoter ? State the function of TFIIH.

2. Characterize different constituents of plasmamembrane. Describe the architecture of plasmamembrane illustrating the respective positions of the constituents. What are symport and antiport ? Write on active transport of plasmamembrane. 5+4+2+5

3. Write short notes on any *two* of the following : 8×2

(a) Parapatric speciation ;

(b) Genome imprinting ;

(c) Role of nucleosome in heterochromatinization ;

(d) Somatic embryogenesis.

4. How does nucleosome structure of ten facilitate gene regulation ? Explain alternate splicing with an example ? Illustrate the regulation of gene function operative prior to transcription in eukaryotic system. 3+3+10

5. Give two examples of RNA playing a role of enzyme, mentioning their respective roles. Describe the structure and function of spliceosome. How can RNA be utilized as medicine ? 3+10+3

6. Comment on the 'species concept'. What do you mean by 'quantum speciation'? Briefly state the significance of molecular studies in understanding the process of speciation. What is the role of spontaneous mutation in population genetics? Which other factor does make it more worthwhile and how. 4+3+4+2+1+2

7. Illustrate the structure of Ti plasmid. How it processed to make an ideal genetic vector? Briefly describe the process of transgenesis of a plant with this vector. What is the utility of choosing an ideal promoter? 4+2+8+2

8. Why DNA transfer with electroporation is not easy with plant cell? What method would you adopt to practice electroporation in plant cell with success? Outline the procedure mentioning all the requisite elements and precautions. State two cytological methods to realize the viability of cells even after performing electroporation. 1+2+10+3

9. (a) How does the immune diversity become effective due to gene regulations at two different levels?

   (b) Which features of a character will ascertain its matric nature?

   Illustrate narrow sense heritability with any allegorical example. 6+2+8
