2009

M.Sc. Part–II Examination

BOTANY

PAPER—X

Full Marks : 100

Time : 4 Hours

The figures in the right-hand 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 : *Cytogenetic & Molecular Biology*

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

1. Answer any *ten* of the following : 2×10

(a) Do short interspersed elements encode reverse transcriptase? How does their transposition occur?

(b) If molecule A is water soluble and molecule B is lipid soluble, then which molecule, A or B, will diffuse through the plasma membrane and why?

(c) What determines whether a microtubule will shrink or grow?

(d) Most cells of an adult animal is in which stage of the cell cycle? What triggers the progression from metaphase to anaphase stage?

(e) What is the function of the lipid components of a membrane?

(f) Give an example of a nucleolus-restricted protein and state its function.

(g) What is the significance of mRNA polyadenylation? Name the mRNA that is not polyadenylated in eukaryotic cells.

(h) Differentiate between minisatellite and microsatellite.

(i) What is the importance of the N-terminal tail in histones?

(j) Why does ds DNA molecule absorb less amount of uv-light than ssRNA of same number of nucleotides?

(k) If a contaminated DNA solution shows less than 1.8 or more than 2.0 ratio of absorbance value of A_{260}/A_{280}, then name the contaminants.

(l) What is the coefficient of relationship, r, between the children of a pair of monozygotic twins married to unrelated spouses?

(m) What type of dominance exists when a F_1 plant shows an intermediate phenotype of the homozygotic parents? What will be the phenotypic ratio in F_2?

(n) Which is the most important trait in plants produced by mutation in mitochondrial gene and how is this inherited?

(o) The universal code AGA specifies arginine. What does it specify in the mitochondrial genome of Drosophila and mammals?

(p) What is the difference between sex-linked inheritance and genome imprinting?

2. Why do calculated recombination fequencies between distantly located loci under estimate the true genetic distance between them ? Somatic cell fusion of mouse and human results in several cell lines. Locate the genes of three enzymes on the human chromosomes from the following. 1+5+5+5

Cell line	Enzymes			Human Chromosomes								
	1	2	3	4	8	9	12	15	16	17	22	X
A	+	–	+	–	–	+	–	+	+	–	–	+
B	+	–	–	–	–	+	–	–	+	+	–	–
C	–	+	+	+	+	–	–	–	–	+	–	+
D	–	+	+	+	+	–	–	–	+	–	–	+

3. With suitable illustrations explain the different molecular mechanisms by which chemicals induce mutations. 16

4. Characterise a typical chloroplast genome and highlight its similarities with eubacterial genome and dissimilarities with eukaryotic nuclear genome. 10+3+3

5. Explain the phenotypic and genotypic variations found in regenerated plants and discuss the causes and implications of these variations. 8+8

6. Write short notes on any *two* of the following : 8×2
   (a) Allopatric speciation ;
   (b) Antibody diversity ;
   (c) Constitutive heterochromatin and its diversity ;
   (d) Back cross breeding method.

7. What prevents the separation of chromatids at anaphase I but allows its separation at anaphase II of meiosis ? What forces are responsible for the poleward movement of chromosomes ? 10+6

8. Answer any *two* of the following : 8×2

(a) How can gene targeting be achieved by insertional mutagenesis ?

(b) Explain the role of different phytohormones in tissue culture.

(c) Mention the different histone PTMs and briefly discuss their transcriptional role.

9. What is meant by N-end rule in post-translational regulation of gene function in eukaryotes ? How does enhancer differ from promoter of an eukaryotic gene ? Illustrate the transcriptional level of gene regulation. What is done by methylation of nucleotides in eukaryotes ? 3+2+10+1

Write the answer question of each Group in separate books.

Special Paper : *Ecology and Taxonomy Special*

Group—A *(Ecology)*

[Marks : 50]

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

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

(i) Eutrophication ;

(ii) Population ;

(iii) Phytoremediation ;

(iv) Global Warming ;

(v) National Park ;

(vi) Crypto-vivipary.

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

(i) Deep ecology ;

(ii) r- and k- strategy ;

(iii) Metabolic poisons as pollutants ;

(iv) Sacred grove ;

(v) Biogeochemical cycle ;

(vi) Chernobyl disaster.

2. Classify environmental stresses. Discuss the various biochemical responses of aquatic plants. 6+9

3. Define wetlands. Enumerate the economic and ecological values of waterlogged areas. 3+(6+6)

4. Define acid precipitation. Discuss the adverse impact of acid rain on flora and fauna. 3+(6+6)

5. Define invasive species. Briefly discuss the adverse effects of invasive specials on environment. Name two invasive species. 3+10+2

Group—B *(Taxonomy)*

[Marks : 50]

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

6. (a) Answer any *six* of the following : 6×2

(i) Name the family of Angiosperms where produce largest fruits.

(ii) Name the father of Palynology.

(iii) Define serotaxonomy.

(iv) Name two important soil binder plants from coastal side of India.

(v) What is paleoherb?

(vi) Name two important Parasitic plants from West Bengal.

(vii) What does it mean by 'Mangal' ? Give an example.

(viii) Who had established Botanical Survey of India ? Mention the year of establishment.

(b) Distinguish between (any *two*) of the following : 2×4

(i) Betalin and Anthocyanin ;

(ii) SEM and TEM ;

(iii) RAPD and RFLP ;

(iv) ICBN and ICPN ;

(v) Vegetation and Flora ;

(vi) Mangrove and True Mangrove.

7. Write down the salient features of the subclass caryophyllidae. Why caryophyllidae called 'centrospermae' ? Discuss the chemical features of this subclass for the segregation of orders. Mention the putative relationships amongst the orders. 5+2+5+3

8. What does it mean by insectivorous plants ? Describe the adaptive features, distribution and phylogenetic relationships of insectivorous plants with examples. Name three important insectivorous plants from India. 2+10+3

9. Define Phytotaxonomy. What are the sementides considered for Phytotaxonomical studies ? Discuss the role of phytochemical characters in solving taxonomic problems. 2+3+10

10. Who first noted about origin of cultivated plants. Mention in details with the help of suitable map of the centre of origin of cultivated plants and also its diversity. 2+10+3

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Write the answer question of each Group in separate books.

Special Paper : *Environmental Botany*

Group—A *(Environment, Plant and Soil)*

[Marks : 20]

Answer any *two* questions of the following.

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

(a) Define environmental strees. Give an example.

(b) What is the full form of PGR? State its uses.

(c) What are the full form of SDP and DNP? Give example from each.

(d) What is physiologically dry soil?

(e) Define capillary water. Why it is called capillary?

(f) Which hormone is responsible for floral stimulus.

(g) Write the full form of NAR. State its function.

2. What are the basic differences between viable and non-viable seeds? State the features which are responsible to form viable seed. Mention in details of the these environmental factors which are directly and indirectly involved in seed germination. 2+3+5

3. What is photoperiodism? Write in brief the role of phytochrome in flowering. What does it mean by vulnarization? 2+6+2

4. Define soil. Enumerate the important chemical properties of soil. Mention the role of soil in plant growth and development. 2+5+3

Group—B *(Environmental Microbiology)*

[Marks : 20]

Answer any *two* questions.

5. (a) Discuss the different applications of cloning technology for betterment of environment.

(b) How are the microbes involved in maintaining soil fertility? 6+4

6. (a) Name four human diseases which are transmitted by water. Mention their respective causal organisms.

(b) Describe the tests through which potability of water can be checked. 4+6

7. (a) Discuss in short, the different biofertilizers, both non-symbiotic and symbiotic, used in agriculture.

(b) Name two diseases transmitted through air. Mention the names of causal organisms. Do you think air is a medium for bacterial multiplication? Justify your answer. 6+(1+3)

8. What do you mean by bioremediation? Discuss the use of microbes for bioremediation of xenobiotics and recalcitrants. 2+4+4

Group—C *(Environment and Forest)*

[Marks : 20]

Answer any *two* questions.

9. What are the causes of deforestation ? How deforestation affects the ecology and environment. 6+4

10. Discuss the status of forests in India. Mention the suggestive measures for the improvement of forests and their productivity in India ? 5+5

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

(a) Biosphere reserve ;

(b) Mycorrhiza and wasteland reclamation ;

(c) Plantation of mined out area ; and

(d) Forest and Wild life.

Group—D *(Environment and Ecology)*

[Marks : 40]

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

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

(a) Mangroves ;

(b) Deep ecology ;

(c) Sacred grove ;

(d) Neurotoxic pollutants ;

(e) *El Nino* ;

(f) Forest fire ; and

(g) Lithophytes.

13. Define wetlands. Discuss the ecological roles of wetlands. 3+12

14. What is acid rain. Discuss the harmful effects of acid rain on forests and aquatic environments. 3+(6+6)

15. What is biodiversity hot-spot. Discuss the economic and ecological values of Indian biodiversity. 3+(6+6)

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