PG/IVS/BOT/XX/11

# M.Sc. 4th Semester Examination, 2011

## BOTANY

PAPER—XX

*Full Marks* : 40

*Time* : 2 hours

*The figures in the right-hand margin indicate marks*

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

*Illustrate the answers wherever necessary*

**Write the answers to questions of each Special Paper in separate books**

Special Paper

( *Advanced Plant Taxonomy* )

Answer *all* questions

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

(*a*) Define DNA–Barcoding. Give an example.

(*b*) Compare anagenesis with cladogenesis.

(*c*) What is saltgland ? Give an example.

(*d*) What is the full form of RuBisCo ?

(*e*) How many zonations occur in Mangrove ecosystem ? Give their names.

(*f*) Mention the advantages and disadvantages of cp DNA in molecular systematics.

(*g*) What are the full form of CITES, UNEP and IUCN ?

(*h*) With examples mention the basic differences between macro-molecules and micro-molecules.

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

(*i*) Importance of cytology in taxonomic study

(*ii*) ITS region of cp DNA

(*iii*) nbcL gene

(*iv*) Effective and valid publication.

3. Answer any *two* of the following : $10 \times 2$

(*a*) Define Megadiversity centre. Name megadiversity centres and Hotspots are identified in the world ? Mention the utilities of megadiversity centre and Hotspot in the light of biodiversity conservation. $1 + 4 + 5$

(*b*) Mention the characteristic features of the subclasses of caryophylidae and commeliniidae. Why caryophylidae is called 'Centrospermae' ? Schematically represent the putative relationships among the orders of caryophylidae. $5 + 2 + 3$

(*c*) What are the basic differences between holo- and hemi-parasites ? Mention the names of families, their distribution and the different types of adaptive features. Schematically represent their relationships. $2 + 3 + 5$

(*d*) Define taxonomic literature. Mention with examples the different kinds of taxonomic literature. $2 + 8$

## Special Paper

## ( *Ecology and Biodiversity* )

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

1. Comment on the following (any *five*): 2 × 5

   (*a*) Carrying capacity

   (*b*) Eutrophication

   (*c*) World Environmental Day

   (*d*) Carbonmonoxide poisoning

   (*e*) *r*-strategy and *K*-strategy

   (*f*) Use of plants to control soil erosion

   (*g*) Ramsar site

   (*h*) Pesticides;

   (*i*) Chapman cycle

   (*j*) IUCN.

2. Write short notes on any *two* from the following : $5 \times 2$

   (*i*) Growth curves

   (*ii*) CFCs

   (*iii*) Minamata disease

   (*iv*) Current concepts in Ecology.

3. Classify the commonly prevalent environmental stresses. Comment on the application of heavy metal tolerance of plants in phytoremediation technique. $6 + 4$

4. Define mangroves. Mention two exclusive adaptive features of mangroves. Discuss the role of the Sunderban mangroves in the protection of Wildlife. $3 + 2 + 5$

5. (*a*) Discuss how greenhouse effect and global warming are related.

   (*b*) Discuss on the adaption of aquatic macrophytes. $5 + 5$

5. What is biological invasion? Discuss on the ecological effects of biological invasion. Name two species (one each from plants and animals) which are invasive in India. 3 + 5 + (1 + 1)

## Special Paper

## ( *Mycorrhizal Biology* )

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

1. Answer any *four* of the following: 2 × 4

   (*a*) What is Monotropoid Mycorrhiza?

   (*b*) What is soil environment? How it affects mycorrhiza?

   (*c*) How mycorrhiza help in P absorption?

   (*d*) Why VAM is called obligate symbiont?

   (*e*) What fossil evidences throw light on the original VAM?

   (*f*) How mycorrhiza can check air pollution?

2. (*a*) Give the classification of VAM fungi ?

   (*b*) Describe the method of multiplication of VAM fungi. 4 + 4

3. Explain the nutritional and non-nutritional roles of mycorrhiza to plant and soil. 8

4. Discuss how mycorrhiza tolerate ecological stress, specially drought situation and the toxic levels of Copper, Aluminium, Zink, and other heavy metals in the rhizosphere. 8

5. Discuss the effects of agrochemical on mycorrhiza and their affects on agriculture. Why VAM inoculation is said to be difficult ? 6 + 2

6. How ectomy corrhizal root is characterized ? Discuss its inoculation methods in field plantations along with limitations. 3 + 5

7. Enlist the present status and the future directions of mycorrhizal research at national and international level. 8

Special Paper

( *Palaeobotany and Palynology* )

Answer *all* questions

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

(*a*) Differentiate silt from clay.

(*b*) What is meant by 'principle of superposition' of rocks ?

(*c*) Write the lithologic characteristics of Rajmahal Fm. of Rajmahal Basin. Mention two important megaflora of this formation.

(*d*) What are 'source rocks' and 'reservoir rocks' in a petroliferous basin ?

(*e*) What is a 'lectotype' ?

(*f*) Differentiate lithostratigraphy from biostratigraphy.

(*g*) What is an ;index fossil' ? Cite an example.

(*h*) Define a 'fault'.

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

(*a*) Describe the processes through which peat becomes transformic into coal. Mention the various ranks of 'coal'. 3 + 2

(*b*) Explain the role of palynology in stratigraphic deduction of oil bearing sequence. 5

(*c*) Briefly describe the megafloristics of Panchet Formation. What is the age of the sequence ? 4 + 1

(*d*) Give a brief account of palaeontological evidences in support of the 'continental drift hypothesis'. 5

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

(*a*) What is the basis of two-fold classification of Indian Gondwana ? Briefly describe the miofloristics of Lower Gondwana in Damodar Valley Basin. 2 + 8

(*b*) What are the criteria of 'valid publication' of name of a fossil plant ? Mention the starting point date and relevant publication of validly published names of fossil plants. Explain briefly the 'principle of priority'. 5 + 2 + 3

(*c*) Describe briefly the Holocene vegetational history of Western India. What is the reason of the origin of desert condition in Rajasthan? 8 + 2

(*d*) Describe megafloral succession during Siluro-Devonian periods. 10

Special Paper

( *Plant Genetics & Biotechnology* )

Answer **Q. No. 1 & 5** are compulsory and attempt *three* questions from the rest taking at least *one* from each Unit

UNIT – I

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

(*a*) Define Robertsonian translocation.

(*b*) What is an isochromosome?

(*c*) What is meant by genetic diversity?

(*d*) What is meant by endoreduplication?

(*e*) State the significance of C-value paradox.

(*f*) Give the full form of SNP used in the field of genetic polymorphism.

(*g*) What is synteny ?

(*h*) What is Xenia ?

**2.** What are unique and repititive sequences of DNA ? Discuss the possible function of repetitive sequences. Why are they still retained after natural selection ? 3 + 4 + 3

**3.** Give an account of the genetic adaptations occurred in course of evolution of the plants growing in temperate region and in adverse condition of tropical area. Mention the significance of these changes. State two mechanisms of chromosome shuntening. 5 + 3 + 2

**4.** Define karyotype. How is it informative for plant evolution ? Give an account of the advanced practices of karyotyping. How is the bimodal karyo type significant for evolution ? 2 + 2 + 4 +2

## UNIT – II

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

(*a*) Mention an initial sign of redifferentiation in callus.

(*b*) What is nurse cell culture?

(*c*) How is embryoid different from embryo?

(*d*) What is synchronization of cell culture?

(*e*) What are the advantages of electroporation technique?

(*f*) What is a recalcitrant callus?

(*g*) What does it mean by disarmed Tiplasmid?

(*h*) Define Biotransformation.

**6.** What are PEDCs and IEDCs? Discuss the developmental phases of somatic embryogenesis *in-vitro*. Give a brief account on factors influencing somatic embryogenesis. 2 + 5 + 3

7. Write notes on the following : 5 + 5

   (*i*) Role of vir genes in Ti plasmid

   (*ii*) Herbicide resistance.

8. What is molecular farming ? Give a brief account of such farming for proteins ? 2 + 8