

**2013**

**M.Sc.**

**4th Semester Examination**

**BOTANY**

**PAPER—BOT-402**

*Full Marks : 40*

*Time : 2 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.*

*Answer all questions.*

**[ Special Paper ]**

**(Advanced Plant Taxonomy)**

1. Answer any *five* of the following : 2×5
- (a) Define 'Flora' and 'Vegetation'. Give example of each.
  - (b) What is the full form of ETS, ITS and IGS?
  - (c) What is IPI?
  - (d) Write the botanical names of two insectivorous plants from your locality and mention their respective family.
  - (e) Define 'Seaward', 'Meso' and 'landward' zones with examples.

*(Turn Over)*

- (f) Define 'euro-' and 'steno-palynous' taxa. Give an example of each.
- (g) Which country hosted last IBC? Name the country where the next IBC will be held in the year 2016.
- (h) Write the botanical names of two aerial stem hemiparasitic and one root parasitic taxa from your locality.

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

- (a) Diagnostic characters of *Judaea* ;
- (b) DNA Bar code and its application ;
- (c) *Index kewensis* ;
- (d) Journal and periodicals ; and
- (e) Cladistics and Phenetics.

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

- (a) Define 'hotspots' and 'megadiversity'. How many hotspots and megadiversity in the world? Mention in details of diversity in Indian hotspots. 4+2+4
- (b) Define parasites. How many types of parasitic plants found in the world? Give examples from each type. Mention the general characteristics and its adaptive features with phylogenetic relationships. 1+2+2+5
- (c) Define molecular systematics. How many molecular characters are used in plant systematics? Give in details (any *two*) of the molecular characters mentioning their advantages and disadvantages. How many types of CP genes were commonly found in plants? Mention their respective location and functions. 1+2+3+2+2

- (d) Mention the characteristic features of the subclass 'Asteridae'. Schematically represent the putative relationships among the orders. 6+4

**[ Special Paper ]**  
**(Ecology and Biodiversity)**

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

1. Comment on the following (any five) : 2×5
  - (a) Earth Day ;
  - (b) Deep ecology ;
  - (c) Eutrophication ;
  - (d) Food chain ;
  - (e) itai itai disease ;
  - (f) Acid precipitation ;
  - (g) Greenhouse effect ; and
  - (h) Traditional Ecological Knowledge (TEK).
2. Define pollutants. Classify environmental pollutants on the basis of their mode of actions. Comment on the toxicity of metabolic and neurotoxic poisons. 1+3+3+3
3. Define mangroves. Discuss mangrove ecosystem and state the role of Sundarbans mangroves in conservation of biodiversity. 2+3+5
4. What is invasive species ? Illustrate with examples how invasive species are threat to local biodiversity. 2+8

5. What is *in situ* conservation? Write the roles of sacred groves and Ramsar sites in conservation of biodiversity. 2+(4+4)
6. Write short notes on any *two* of the following : 5×2
- (a) Growth curves ;
  - (b) Bhopal tragedy ;
  - (c) Phytoremediation ; and
  - (d) Ozone hole.
- 

**[ Special Paper ]**  
**(Microbiology)**

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

1. Answer any *five* questions : 2×5
- (a) What is decimal reduction time ?
  - (b) What are secondary electrons ? Give their utilities in SEM.
  - (c) What is triple vaccine ? Give example.
  - (d) Write scientific name of two microorganisms able to leach copper from its ore.
  - (e) What is natural passive immunity ? Give example.
  - (f) What are prions ? Name a disease caused by them.
  - (g) Give two important properties of Chlamydia.
  - (h) Write down two industrial applications of amylase.

2. Write short notes on (any four) :  $2\frac{1}{2} \times 4$
- (a) C-DNA library.
  - (b)  $T_4$  ligase.
  - (c) Tricking filter.
  - (d) BLAST.
  - (e) Purple sulfur bacteria.
  - (f) Cholera toxin.
3. (a) What is blue cheese? Name the organism generally used for its ripening process. Write down in detail the steps of cheese making process.
- (b) Write the raw materials required and microorganisms involved in Kefir production.  $(1+1+6)+2$
4. (a) How animal viruses are cultivated in the laboratory?
- (b) Write down the mode of action of Streptomycin.
- (c) Schematically represent municipal waste water treatment system.  $4+2+4$
5. Compare the following (any four) :  $2\frac{1}{2} \times 4$
- (a) Competitive and non-competitive enzyme inhibition.
  - (b) Toxin and Toxoid.
  - (c) Mycoplasma and L-phase variant.
  - (d) Serine protease and acid protease.
  - (e) Chemotroph and lithotroph.
  - (f) Cosmid and pBR 322.
  - (g) Dump leaching and in-situ leaching.

6. (a) Write down in detail the process of ELISA.  
(b) Draw and describe the structure of an Immunoglobulin G molecule.  
(c) What is haptin? 5+4+1
- 

**[ Special Paper ]**  
**(Mycorrhizal Biology)**

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

1. Answer any four of the following : 2×4
- (a) Write names of two fossils in which VAM like structures has been seen.
  - (b) Write the names of two plants for each of which form (i) myectomycorrhiza and (ii) ectomycorrhiza and vam both.
  - (c) What is nurse seedling?
  - (d) What is Monotropoid mycorrhiza?
  - (e) Mention two herbicides which decrease the colonization of vam.
  - (f) Write two characters by which the genus *Gigaspora* is identified.
  - (g) What is MHB? Give an example.
  - (h) VAM is now called AM, why?

2. How a soil is polluted with heavy metals? Discuss the role of VAM in heavy metal amelioration. 2+6
3. (a) How does the *Rhizobium* interact with VAM?  
(b) Explain the Mycorrhizal dependency factor. 4+4
4. What are agrochemicals? Discuss the affect of N fertilizer on VAM and its effect on plant. 2+6
5. Write the distribution of ectomycorrhiza in nature. Explain the sources of ecomycorrhizal inoculum and their limitations. 3+5
6. Describe the methods of field applications of VAM. 8
7. Write short notes on any two of the following : 2×4
  - (i) Classification of VAM fungi ;
  - (ii) Soil environment ;
  - (iii) Mycorrhiza and draught resistance.

---

**[ Special Paper ]**

**(Palaeobotany and Palynology)**

Answer all questions.

1. Answer any five of the following : 2×5
  - (a) Distinguish between clay and salt.
  - (b) What is an 'epitype'?
  - (c) Mention two important megafloral elements known from the Rajmahal Formation.

- (d) Define a 'fault'.
- (e) What is meant by 'taphonomy'?
- (f) What is meant by 'diagonesis'?
- (g) Define 'Palaeomagnetism'.
- (h) What is 'fusain'?

2. Answer any *two* of the following : 5×2
- (a) Enumerate the criteria for 'valid publication' of names of fossil plants. 5
  - (b) Explain the role of palynology in stratigraphic deduction of oil bearing sequence. 5
  - (c) Define unconformity. Distinguish between 'angular unconformity' and 'disconformity'. 2+3
  - (d) Briefly describe the megafloristics of Karharbari Formation.  $2\frac{1}{2}+2\frac{1}{2}$

3. Answer any *two* of the following : 10×2
- (a) Write the basis of two-fold classification of Indian Gondwanas. Describe the megafloristics of Middle Gondwana. 2+8
  - (b) Describe briefly the Holocene vegetational history of Bengal basin. 10
  - (c) Describe the megafloral succession through Siluro-Devonian sequence. 10
  - (d) What are meant by 'Correlation' and 'Stratigraphy'? What is the 'principle of superposition'? How do plant fossils help in stratigraphic deductions. 3+2+5



**[ Special Paper ]**  
**(Plant Genetics and Biotechnology)**

Answer Q. No. 1 & 5 and three questions  
from the rest taking at least one from each unit.

**UNIT - I**

1. Answer any five of the following : 1×5
  - (a) What is C-value paradox?
  - (b) What advantage does a polycentric chromosome have?
  - (c) Characterize 'mesokaryota' with example.
  - (d) Define bomodol karyotype.
  - (e) Why determination of base number of chromosome is important?
  - (f) How does microchromosome differ from accessory chromosome in bryophytes?
  - (g) State the significance of GC content value.
  - (h) What is the adaptive advantage of heterochromatin?
2. What is meant by 'genotypic' and 'nucleotypic' DNA? Comment on the relationship between DNA content, chromosome size and heterochromatin in plant system. Briefly discuss different mechanisms of change in DNA content as instrumental in plant evolution. 2+3+5
3. State the chromosomal characteristics in fungi. Comment on the sex chromosomes of bryophytes. Describe, in brief, diverse nature of chromosomal complement in angiosperm. 2+3+5
4. Define B chromosome. Enumerate its distinguishing features from other chromosomes. Discuss on the role played by these chromosomes and their significance.

2+2+6

5. Answer any *five* of the following : 1×5
- (a) What is a recalcitrant callus?
  - (b) How can you get a homozygous plant through *in vitro* culture?
  - (c) What is the utility of nurse cell culture?
  - (d) Name a secondary metabolite and its plant source.
  - (e) How does fluoresceindiacetate work to prove cell viability?
  - (f) Name two inhibitors of DNA synthesis used in synchronization of cell culture.
  - (g) Distinguish between miniprotoplast and cytoplast.
  - (h) How is plating efficiency in cell suspension culture determined?
6. Enumerate the objectives of plant protoplast culture. Describe the major steps of this culture technique. State the role of physical and chemical agents used for fusing protoplasts. 2+5+3
7. Write brief notes on the following : 5+5
- (a) Electroporation — a physical vector for DNA transfer.
  - (b) Techniques for selecting out somatic hybrid.
8. Mention the steps by which *Agrobacterium* gets associated to plant and start gall formation. Enlist different parts of Tiplasmid and their respective roles on integrating T-DNA to host nucleus.
- How is T1 plasmid processed to make a vector for genetic engineering? 2+4+2