

2015

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.

Special Paper

Set—I

(Advanced Plant Taxonomy)

Answer all questions.

1. Answer any *five* of the following : 5×2
- (a) Define molecular systematics. Give an example.

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- (b) Define serotaxonomy. Give an example.
 - (c) Name two key characters of the subclass Magnoliidae
 - (d) Name one most primitive fossil angiosperm. Who first discovered it ?
 - (e) Name two important Taxonomical Journals.
 - (f) Define 'Salt gland'. Where is it found ? Mention its function.
 - (g) Define 'cryptovivipary'. Give an example.
 - (h) Define 'Index Kewensis'. Who first compiled this ? Mention the year of 1st publication.
 - (i) What is meant by disjunction ? Give an example.
2. Write short notes on any *two* : 5×6
- (a) Monographs, Flora & Revisions.
 - (b) Mangal zenations and its significance in Mangrove areas.
 - (c) *In situ* and *Ex situ* conservations.
 - (d) ITS regions and its significance.

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

(a) What are the differences between ICN & ICBN? In which year ICN has been introduced and mention the name of which IBC has adapted this. Mention in details of the principles of ICN. 3+2+5

(b) Define micro and macromolecules. How many molecular data are commonly used for solving taxonomical problems? How are the plant molecular data acquired? Write in detail the types of DNA sequence data with advantages and disadvantages. 1+1+2+2+4

(c) Define hemiparasitic angiosperms. What are the molecular differences between holo & hemi parasitic angiosperms? Mention 6 common hemiparasitic taxa with their taxonomical distribution (subclasses, orders and families), adaptive features and their phylogeny. 1+2+4+3

(d) What is Numerical Taxonomy? Describe the different steps involved in Numerical Taxonomic studies. 2+8

Set—2**(Ecology and Biodiversity)**

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

1. Comment on the following (any five): 2×5
- (a) World Environment Day.
 - (b) Bhopal gas tragedy.
 - (c) *Silent Spring*
 - (d) Growth curves.
 - (e) Missing sink.
 - (f) "Good" ozone and "bad" ozone.
 - (g) Phytoremediation.
 - (h) Sustainable development.
2. Enumerate the types of environmental pollutants classified based on their mode of action. Write the harmful effects of metabolic and neurotoxic pollutants. 4+(3+3)
3. What is global warming? Discuss the direct and indirect effects of global warming on environment and human health. 2+(4+4)

4. Define stress. Mention the commonly prevalent environmental stresses. Comment on the biochemical basis of plant adaptation to waterlogging. 2+3+5
5. What is invasive species? Discuss with example how invasive species are threat to biodiversity and economy. 2+(4+4)
6. What are Ramsar sites? Comment on the roles of these areas in conservation of biodiversity. 2+8

Set—3

(Microbiology)

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

1. Answer any *five* questions : 2×5
- (a) What is the utility of rennet in cheese making?
- (b) What is reporter gene? Give an example.
- (c) Write down two industrial application of amylase.
- (d) What are the raw materials used during Kefir production?

- (e) Name each of a purple and green sulfur bacteria.
 - (f) Name two microbes used in industrial production of citric acid.
 - (g) Write down the full form of BCG and DPT.
 - (h) What are col plasmids ?
2. (a) Write down the process of microbial leaching of copper.
- (b) Discuss about the structure of nitrogenase found in *Azotobactor*.
- (c) How is nif gene regulated ? 4+3+3
3. Write short notes on (any four) : $2\frac{1}{2} \times 4$
- (a) Class switching.
 - (b) pBR 322.
 - (c) Blue cheese.
 - (d) Spirochaete.
 - (e) Sandwich ELISA.
 - (f) Production of glutamic acid.
 - (g) Oncogenes.

4. (a) Write down different mechanisms of antibiotic resistance developed in bacteria.
- (b) What is semisynthetic antibiotic? Why is it preferred than natural one.
- (c) Write down the mode of action of streptomycin.

6+(1+1)+2

5. Compare the following (any five) :

2×5

- (a) Competitive and non-competitive inhibition.
- (b) SEM and AFM.
- (c) c-DNA library and genomic library.
- (d) Pasteurization and sterilization.
- (e) Disinfectant and antiseptic.
- (f) Toxin and toxoid.
- (g) B-Lymphocyte and T-Lymphocyte.
- (h) Agglutination and precipitation.

6. (a) Write down the process of cheese making.
- (b) How is antibody diversity is generated in an individual?

5+5

Set—4**(Palaeobotany and Palynology)**

1. Answer any *five* questions : 5×2

- (a) Distinguish between cobbles and pebbles.
- (b) Define an 'epitype'.
- (c) What is meant by 'diastrophism'?
- (d) Mention two important megafloral elements known from Dubrajpur Formation.
- (e) What is meant by 'index fossil'?
- (f) What is meant by 'principle of superposition of rocks'?
- (g) What is stromatolite?
- (h) What is meant by 'kerogene'?

2. Answer any *two* : 5×2

- (a) Write about the major constituents of a typical bituminous coal.
- (b) How do plant fossils help in stratigraphic deductions?

(c) Enumerate the criteria for 'valid publication' of names of fossil plants.

(d) Briefly describe the megafloristics of Tiki Formation.

3. Answer any *two* : 2×10

(a) What is meant by Gondwana sequence? Write the basis of two fold classification of Indian Gondwanas. Describe the megafloristics of Lower Gondwana in Damodar Valley basin. 1+2+7

(b) Describe briefly the Holocene vegetational history of Western India. 10

(c) Discuss the significance of Palaeopalynology in petroleum exploration. 10

(d) Describe the megafloral succession through Siluro-Devonian sequence. 10

- (c) Name a product of biopharming.
- (d) What is a friable callus ?
- (e) Name a condition/factor in *in vitro* that favours somatic embryogenesis.

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(Turn Over)

10

Set—5

(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 advantage is obtained, from a diffuse centromere ?
 - (b) Why is Dinophyceae considered as “mesokaryota” ?
 - (c) How does microchromosome in bryophytes differ from accessory chromosomes ?
 - (d) What is the significance of the presence of larger size of chromosome in gymnosperms ?
 - (e) Distinguish genotypic DNA from nucleotypic DNA.
 - (f) How does the GC content of an organism signifies its status ?
 - (g) What is supernumerary chromosome ?
2. Why, in respect of chromosomal characteristics, fungi are considered as a degenerate line or blind lane in evolution ? Give a brief account of the evolution related changes in chromosomal complements in algae and bryophytes. How does polyploidy provide advantage for

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(Continued)

- (f) What is octapine ?
- (g) Give an example of an economically important secondary metabolite produced in plant cell suspension culture.
- (h) What is somatic embryogenesis ?
6. What is cell suspension culture ? How is single cell culture initiated from suspension culture ? Enlist the utilities of suspension culture. 2+4+4
7. Write brief notes on any *two* of the following : 5×2
- (a) Electroporation.
- (b) Advantages of biopharming in plant systems.
- (c) Gene gun.
8. Show the different vital parts of Ti plasmid with the aid of a suitably labelled diagramme. Give an outline of the infection of plant by the Ti plasmid bearing bacterium and integration of its DNA with host genome. What should be the ideal site of polylinker in this plasmid and why? 4+4+2
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