2018

M.Sc. 4th Semester Examination

BOTANY

PAPER—BOT-403

Subject Code—23

Full Marks : 40

Time : 2 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.

Special Paper : *Angiosperm Taxonomy and Molecular Systematics*

[Molecular Systematics]

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

(a) Define molecular systematics.

(b) What is the full form of RFLP & AFLP ?

(c) What is the full form of ITS ? Mention its function.

(d) What is the full form of OTU & UC ? Mention its functions.

(e) What is the full form of cp DNA & mt DNA ?

(f) Name two important hemiparasites from South West Bengal.

(g) Define salt gland. Give an example.

(h) Name two dye yielding plant with family from South West Bengal.

2. Write the differences of any *two* of the following : 2×5

(a) Phenetics and Cladistics ;

(b) Cladogram and Phylogram ;

(c) Coding and non-coding genes spacers ;

(d) Endangered and Threatened taxa (As per IUCN).

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

(a) What is numerical systematics ? Who first proposed this systematics ? Why it is called Adansonian Taxonomy/ systematics ? Mention it principles and applications. Write the merits and demerits of this system. 2+1+1+4+2

(b) What is molecular systematics ? What are the basic differences between molecular systematics and chemosystematics ? Mention in details of two important molecular characters in solving taxonomic problems. Mention the merits and demerits of molecular systematics. 2+2+4(2+2)+2

(c) What is mangal ? How many zonations in the typical mangrove ecosystem ? Discuss in details with example of the adaptive features, distributions & phylogeny of mangrove taxa. Name two old and new world mangrove taxa. 1+2+5+2

(d) What is digital herbaria ? What are the differences between traditional and digital herbaria ? Mention its applications in modern systematics. Name two digital herbaria [one from India and another from the world]. 2+2+4+2

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Special Paper : *Cytogenetics & Biotechnology*

[Biotechnology]

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

(a) Mention four basic features of Z-DNA.

(b) What does all letters of "C_0t" curve signify ?

(c) What is c-value ? What would be its status at S-phase of cell cycle of a diploid organism ?

(d) What is diable crossing ? State its principle.

(e) What is friable callus ? Name any factor that can induce it in vitro.

(f) How does GC content affect T_m value ?

(g) Name two chemical fusogens.

(h) Explain the 5′ and 3′ polarity of a DNA molecule.

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

(a) Comment on $C_o t$ analysis.

(b) Illustrate the basic structure and working principle of gene gun.

(c) Give an account of the measures testing viability of cells in culture.

(d) What do you mean by genomic complexity. How does DNA renaturation process reveal genomic complexity.

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

(a) Define progeny testing in a breeding program. Outline the procedure. Mention its demerits. 1+7+2

(b) What is macerozyme ? Describe schematically the process of protoplast isolation. Briefly state the measures for hybridizing protoplast. 2+4+4

(c) What is suspension culture ? Outline its procedure. Comment on its use. 2+5+3

(d) Mention the ideal features of a plasmid to act as a vector for genetic engineering. State the working principle of electroporation. Illustrate its procedure. 3+2+5

Special Paper : *Ecology and Biodiversity*

[Biodiversity]

1. Write short notes any *five* of the following : 5×2

(a) Biodiversity Hotspot ;

(b) CITES ;

(c) Sanctuary ;

(d) Gene Bank ;

(e) WWF ;

(f) Biome ;

(g) Tiger project ;

(h) ENVIS centre.

2. Comment on any *two* of the following : 2×5

(a) Botanical Garden and Conservation ;

(b) Species Richness ;

(c) Ecological value of biodiversity ;

(d) Ramsar site.

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

(a) Define biodiversity at various levels and temporal scales. Discuss the roles of National Parks and Biosphere Reserves in biodiversity conservation. 4+(3+3)

(b) Define Invasive Alien Species (IAS). Comment with examples the threats caused by IAS to plant diversity. 3+7

(c) What is traditional conservation of biodiversity ? Discuss the ethical dimentions of plant conservation. 4+6

(d) Discuss briefly the roles played by BSI and ZSI in documenting biodiversity. 5+5

Special Paper : *Microbiology*

[Microbiology : Applied]]

1. Answer any *five* questions : 5×2

(a) Name two microorganisms able to leach copper from its ore.

(b) What are the raw materials used in 'kefir' production ?

(c) Name two microorganisms used in industrial production of citric acid.

(d) Which I_g can cross the placenta and which one is found mother's milk to give rise passive immunity ?

(e) Distinguish between immunogen and immunoglobulin.

(f) What is enzyme immobilization ?

(g) What is bioplastic ? Give example.

(h) What is red wine ?

2. Answer any *two* questions : 2×5

(a) How antibody diversity is generated in an individual ?

(b) Define xenobiotics. Depict in brief the role of microorganisms for removal of such compounds for atmosphere. 2+3

(c) Write down industrial production process of glutamic acid.

(d) Write down mechanism of action of BT toxin in Lepidopterian insect.

3. Answer any *two* questions : 2×10

(a) What is blue cheese ? Name the organism used for its ripening process. Discuss cheese making process. 2+1+7

(b) Write notes on :

(i) Role of microorganisms in biogas production ;

(ii) Biopesticides and its mode of action. 5+5

(c) What is vaccine ? Give example of a triple vaccine. How monoclonal antibody is produced ? 2+1+7

(d) Draw and discuss different parts of a bioreactor. How acidophilous milk is produced ? 3+4+3

Special Paper : *Mycology & Plant Pathology*

[Plant Pathology]

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

(a) What is HR ?

(b) Name the causal organisms of wilt and root rot of Sissoo.

(c) Define mycorrhiza. Where does it occur ?

(d) What are active invaders ? Give an example.

(e) What are rhizomorphs ? Give an example.

(f) Define principle of avoidance in disease control.

(g) Write the chemical composition of Burgundy mixture.

(h) Name two important tissue culture techniques of importance to plant pathology.

2. Write notes on any *two* : 2×5

(a) Factors of decay ;

(b) Root rot of teak ;

(c) Mycorrhiza in disease management ;

(d) Control of timber decay by preservative.

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

(a) Name causal organisms, symptoms and control measures of root rot of sal and bacterial wilt of teak. 5+5

(b) Comment on the origin and evolution of mycorrhiza. 10

(c) How will you diagnose infections and non-infections diseases ? 5+5

(d) Discuss the biotechnological approaches to making resistant plant. 10

Special Paper : *Palaeobotany, Palynology and Plant Reproductive Biology*

[Palynology and Plant Reproductive Biology]

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

(a) What is sporopollenin ? Mention its chemical nature.

(b) What is pollinosis or hay-fever ?

(c) What is kerogene ?

(d) What is meant by taphonomy ?

(e) What is anthesis ?

(f) What are floral rewards ?

(g) Differentiate between dichogamy and herkogamy.

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

(a) Write about the constituents of a typical bibuminous coal. 5

(b) Why pollen grains cause allergy ? Write some allergenic plant taxa of West Bengal. 3+2

(c) Describe autogamy and allogamy. What is inbreeding depression ? 3+2

(d) What is anthesis ? Discuss different floral shapes with respect to pollination. 2+3

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

(a) Describle the Pleistocene vegetational history of Kashmir valley through pollen analysis. 10

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

(c) What is meant by pollination syndrome ? Discuss about the general features of flowers involved in different pollination syndromes. 2+8

(d) What is meant by aperture of a pollen grain ? Discuss the trend of apertural evolution of the pollen grains of angiosperms. 1+9

Special Paper : *Plant Physiology, Biochemistry and Molecular Biology*

[Biochemistry & Molecular Biology]

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

(a) Name two steroid hormones that function as signal molecules.

(b) Write the full form of MALDI-TOF.

(c) Name two anion exchangers.

(d) What is calmodulin ?

(e) Why protein molecules tend to precipitate at high salt concentration ?

(f) Name two semiessential amino acids.

(g) What is dialysis ?

(h) What is meant by protein targeting ?

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

(a) Gel filtration chromatography ;

(b) Ion exchange chromatography ;

(c) Affinity chromatography ;

(d) Method of amino acid sequencing.

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

(a) What is the difference between carotene and xanthophyll ? Briefly describe the pathway of carotenoid biosynthesis. Mention the biological significance of carotenoids. 2+6+2

(b) Describe the structural classes of proteins. Name one biologically important dipeptide and one tripeptide. 8+2

(c) Write a short note on receptors of signal molecules in the plasma membrane. Describe the role of cAMP as second messenger. 6+4

(d) What do you mean by assisted protein folding ? Illustrate the role of chaperones in protein folding. 2+8

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