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PG/4th Sem/BOT/19

2019

M.Sc.

4th Semester Examination

BOTANY

Paper - BOT 403

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.*

**SPECIAL PAPER : ANGIOSPERM TAXONOMY
AND MOLECULAR SYSTEMATICS**

[Molecular Systematics]

1. Answer any *five* questions from the following : 2×5
 - (a) Write the full forms of cp DNA and r DNA.
 - (b) What is SNPs ?
 - (c) What is the full form of ITS ? Mention the types of ITS.

[Turn Over]

- (d) Name two mangrove associated plants of Sundarbans and their respective family.
- (e) Name an endemic saprophytic angiospermic species of India having largest flower.
- (f) Mention two properties of unit character.
- (g) Write the full forms of OTUs and OEUs.
- (h) Name two dye yielding plants of West Bengal and mention their families.

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

5×2

- (a) Endangered and Threatened plants.
- (b) Phenetics and Cladistics.
- (c) RFLP and AFLP; and
- (d) Vivipery and cryptovivipery.

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

- (a) What is Numerical Taxonomy ? Who has first proposed this system ? Why it is called as Neo-Adansonean systematics ? Mention its principles and applications. Write the merits and demerits of this system.

2+1+2+3+2

(3)

- (b) What are parasitic angiosperms ? What are the differences between holo and hemiparasites ? Discuss in detail with-example of the adaptive features, distribution & phylogeny of parasitic taxa. 2+3+5
- (c) Define molecular systematics. What are the differences between molecular and chemosystematics ? What are the characters viz cp DNA, mt DNA and nuclear DNA ? Mention the significance in molecular systematics.
- (d) What is digital herbarium ? What are the basic differences between traditional and digital herbarium ? Mention the applications of digital herbarium in modern systematics. Name two digital herbaria from India & Abroad. 2+3+3+2

SPECIAL PAPER : CYTOGENETICS, MOLECULAR BIOLOGY & BIOTECHNOLOGY

[Molecular Biology & Biotechnology]

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

- (a) Define C-value paradox.

[Turn Over]

- (b) State the working principle of gene gun.
- (c) Write the full form of VNTR and state its significance.
- (d) How does hydroxylapatite column help in Cot analysis ?
- (e) Enumerate different forms of DNA damages with brief illustration.
- (f) Mention the characteristic features of A form of DNA.
- (g) State the working principle of electroporation and demerits of the method.
- (h) Mention two uses of suspension culture.

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

- (a) Write a brief note on molecular farming.
- (b) Detail the construction of Ti plasmid with a diagrammatic illustration.
- (c) Give a brief account of singleseed descent method.
- (d) Briefly describe the functioning of ribozyme.

(5)

3. Answer any *two* of the following : 10×2
- (a) Give a comprehensive account of the physical method of DNA cloning. Enumerate its different uses. 8+2
 - (b) Describe the breeding method of Diallele crossing. State its significance. 8+2
 - (c) Write a comprehensive note on DNA repair mechanism. 10
 - (d) How can a pure line be developed through *invitro* technique ? Illustrate the method. 2+8

SPECIAL PAPER : MICROBIOLOGY

[Microbiology (applied)]

1. Answer any *five* questions from the following : 2×5
- (a) What are oral vaccines ? Give example.
 - (b) Name two biopolymer with their source organism.
 - (c) Name two water borne diseases.

[Turn Over]

- (d) Mention two microorganisms involved in degradation of xenobiotics and petroleum.
- (e) Mention two common serological methods employed in medical practices.
- (f) Name any two food borne diseases and mention their causal organisms.
- (g) What is BLAST ?
- (h) Name two microorganisms used in industrial production of glutamic acid.

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

- (a) Write down microbial production process of citric acid.
- (b) How antibody diversity is generated in human body ?
- (c) Write down municipal sewage treatment process.
- (d) Discuss 'Kefir' production.

3. Answer any *two* questions : 10×2

- (a) Discuss different classes of Immunoglobulins.
What is cell mediated immunity ? 6+4

(7)

- (b) What are biofertilizers ? Mention different biofertilizers used in agriculture. Mention demerits of biofertilizers. 2+6+2
- (c) Write down the process for desulfurization of coal. Mention differences between primary and secondary sewage treatment. 7+3
- (d) What are probiotics ? What characters are considered for using a microorganism as probiotic ? What is scale up process in industrial microbiology ? 2+5+3

**SPECIAL PAPER : MYCOLOGY
& PLANT PATHOLOGY**

[Plant Pathology]

1. Answer any *five* questions from the following : 2×5
- (a) What are the two main types of timber decay ?
- (b) What is the difference between sign and symptom ?
- (c) Define totipotency.
- (d) What is a syndrome ?

[Turn Over]

(e) Name the causal organisms of khair root rot and sandal spike disease.

(f) What is the importance of SYM pathway ?

(g) What is MGI ? What does it do ?

(h) Which type of mycorrhiza is most primitive and how old is it ?

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

(a) Preservative treatment to control decay;

(b) Sissoo root rot;

(c) Diagnosis of non infectious diseases;

(d) Sterile and fertile structures formed during eucalyptus pink disease.

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

(a) What do you know about naturally decay resistant species ? How does decay occur during storage ? $5+5$

(b) Name causal organisms, symptoms and control measures of teak root rot and sissoo wilt. $5+5$

- (c) What are the general principles of plant disease management ? Differentiate active and passive invaders. 5+5
- (d) Discuss the mechanism of prepenetration with figures. 10

**SPECIAL PAPER : PALAEOBOTANY,
PALYNOLOGY AND PLANT
REPRODUCTIVE BIOLOGY**

(Palynology and Plant Reproductive Biology)

1. Answer any *five* questions from the following : 2×5
- (a) What is meant by pollenkitt ?
- (b) What are ubish bodies ?
- (c) What is organic sapropel ?
- (d) Differentiate geitonogamy from xenogamy.
- (e) What are source rocks and reservoir rocks with respect to petroleum deposition ?
- (f) Distinguish between autogamy and allogamy.

[Turn Over]

- (g) Mention different ranks of coal with respect to carbon content.
- (h) Name two marker pollen grains of Indian Lower Gondwana Coal.

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

- (a) How allergy caused by pollen grains can be diagnosed ? 5
- (b) Comment on the organic origin of crude petroleum. 5
- (c) What is meant by deceit pollination ? Give example. 5
- (d) What are the differences between attractants and rewards ? Give examples. 5

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

- (a) Discuss how late quaternary vegetational history in Bengal basin could be reconstructed on the basis of pollen analytical data? 10
- (b) Describe the process of formation of different types of Coal. What is fusain ? 8+2

- (c) Write down the components responsible for floral pigments and colour. How colour of flowers influences the visitation pattern of insect. 4+6
- (d) What are meant by flowering phenology and floral display size. What are meant by 'steady state flowering, cornucopia flowering and Bigbang flowering species ? Cite examples.
4+6(2+2+2)

**SPECIAL PAPER : PLANT PHYSIOLOGY,
BIOCHEMISTRY AND MOLECULAR BIOLOGY**

[Biochemistry and Molecular Biology]

1. Answer any *five* questions from the following : 2×5
- (a) Name two enzymes involved in carotenoid biosynthesis.
- (b) Define domain and motif of proteins.
- (c) What is MAP kinase ?
- (d) What is the basic principle of ion-exchange chromatography ?

[Turn Over]

- (e) Structurally represent how amino acids are united to form a polypeptide chain.
- (f) What is the difference between local and long-distance signalling ?
- (g) What is the function of Calmodulin ?
- (h) What is Sanger's reagent ? Mention its role in protein sequencing.

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

5×2

- (a) Biological significance of carotenoids;
- (b) Role of calcium as second messenger;
- (c) Denaturation of proteins; and
- (d) Symport and antiport.

3. Answer any *two* from the following :

10×2

- (a) Describe the structure of chaperonin GroEL. Mention the mechanism of GroEL/GroES system in protein folding. 3+7
- (b) Discuss the mechanism of action of receptor tyrosine kinase. How a signal is transduced via phosphorylation cascade ? 5+5

(13)

- (c) Write a short note on protein targeting. Briefly discuss the role of glycosylation in protein targeting. 5+5
- (d) What is functional genomics ? Mention the approaches of functional genomics that can be applied to extract information at RNA and protein level. 2+8
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