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PG/4th Sem/BOT/19

2019

M.Sc.

4th Semester Examination

**BOTANY**

Paper - BOT 402

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**

**[Angiosperm Taxonomy]**

1. Answer any *five* questions from the following : 2×5
  - (a) Who was the author of "Bengal Plants"?  
Mention the year of publication.
  - (b) Who has established BSI ? Mention the year of  
establishment.
  - (c) Name the most primitive angiosperm species  
since APG-III 2009. Mention its family.

*[ Turn Over ]*

- (d) Name two vesselless angiospermic genera with their respective family.
- (e) Name two Botanical journals of India with their respective places of publications.
- (f) What are Eudicots ? Give examples.
- (g) Name two Mangrove taxa of West Bengal.
- (h) Define Paraphyly.
2. Write the differences on any *two* questions of the following : 5×2
- (a) Homology and Homoplasy;
- (b) ICBN and ICN;
- (c) Monographs and Revisions; and
- (d) *in-situ* conservation and *ex-situ* conservation.
3. Answer any *two* questions of the following : 10×2
- (a) What are meso angiosperms ? What are the differences between meso angiosperms and eudicots ? Mention the three important characters of eudicots. Name one most primitive fossil angiosperm.

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- (b) Define biodiversity. Mention the level of biodiversity. Mention the number of Hotspots of the world. Name the Hotspots of India. 2+5+1+2
- (c) Write notes on the following : 2.5×4
- (i) Gene bank;
  - (ii) Activities of Botanical Survey of India;
  - (iii) Cryopreservation;
  - (iv) Sero-taxonomy.
- (d) (i) Define conservation. Mention the aims and activities of Protected Area Network. 1+4
- (ii) Define type and the kinds of type. 5

### **SPECIAL PAPER : CYTOGENETICS**

1. Answer any *five* questions from the following : 2×5
- (a) Write the full form of MTOC. State its location and function in a cell.
- (b) Mention the function of G1 phase of a cell cycle. What is the quiescent stage ?

[ Turn Over ]

- (c) How is depression associated to inbreeding ?
- (d) Distinguish between polygene and oligogene.
- (e) How does population genetics differ from Mendelian genetics ?
- (f) What are puffs of lampbrush chromosome ? State their significance.
- (g) Why is cell membrane considered dynamic ?
- (h) What is bottleneck condition of a population ?

2. Answer any *two* questions from the following :

5×2

- (a) Illustrate quantum speciation with suitable example. 5
- (b) Describe the roles of cyclins and cdks during G1 to G2 phase. 5
- (c) Define genetic drift. Describe the cause of its occurrence and its impact on a population. 2+3
- (d) What is cell signaling ? Detail the role of G protein coupled receptor. 2+3

3. Answer any *two* questions from the following :

10×2

- (a) Explain the constancy of allele frequency in the light of Hardy-Weinberg principle. Why random mating and absence of selection are considered two conditions to favour the principle ? 5+5
- (b) Illustrate the species concept. Detail the process involved in Allopatric speciation. Contrast it with peripatric speciation. 3+5+2
- (c) Describe the different phases of cell cycle mentioning their respective significance. State the roles of the factors determining progress through mitotic phases. 6+4
- (d) Enumerate the characteristics of polygenes. Why narrow sense heritability is claimed to have more precision ? 5+5=10

### **SPECIAL PAPER : MICROBIOLOGY**

#### **[Microbiology : Basic]**

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

- (a) What is alternative form of nitrogenase ?

[ Turn Over ]

- (b) What are viroids ?
- (c) Write down mode of action of streptomycine.
- (d) Give example of two methanotrophic microorganism.
- (e) What is competitive inhibition ?
- (f) Define pure culture.
- (g) What is quorum sensing ?
- (h) Name two chemosynthetic microorganisms.

2. Answer any *two* questions : 5×2

- (a) What is biofilm ? Mention different characters of biofilm. 2+3
- (b) Write down different characteristics of actinomycetes.
- (c) Write down mode of action and applications of proteases. 2+3
- (d) Compare c-DNA library with genomic library.

3. Answer any *two* questions : 10×2

- (a) Write down different types of biological nitrogen fixation. How rhizobial biofertilizer can be prepared in large scale. 5+5

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- (b) Write notes on the following : 5+5
- (i) Topoisomerase.
  - (ii) Plant-Microbe relation.
- (c) What is diauxic growth ? How synchronous growth can be developed in laboratory ? Mention different environmental factors that influences microbial growth. 2+5+3
- (d) Mention different ways of drug resistance found in bacteria. Write down properties of cancerous cells. 5+5

**SPECIAL PAPER : MYCOLOGY &  
PLANT PATHOLOGY**

**[Mycology]**

1. Answer any *five* questions from the following : 2×5
- (a) What are free radicals ? Give example.
  - (b) Briefly describe the structure of cephalosporin.
  - (c) What are the defence mechanisms against free radical attack ?

*[ Turn Over ]*

- (d) What does sordarin target and what is the mode of action ?
- (e) Name 2 first generation cephalosporins.
- (f) Why is penicillin not active on dormant bacteria ?
- (g) Name 2 sources of cyclosporin.
- (h) What is tempeh ?
2. Write notes on any *two* of the following : 5×2
- (a) Causes of free radical generation.
- (b) Hyperglycemia and ROS.
- (c) Griseofulvin.
- (d) Fumaric acid.
3. Answer any *two* questions : 10×2
- (a) What is oxidative modification hypothesis of atherosclerosis ? Describe the function of ROS in ischaemia/reperfusion. 5+5
- (b) What are SPB s ? What are the different types found in fungi and their function ? 10
- (c) What do you know about penicillin and its production ? 10



- (d) What are the mechanisms by which AM fungi play a beneficial role ? 10

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

[Palaeobotany]

1. Answer any *five* questions from the following : 2×5
- (a) What is meant by principle of superposition of rocks ?
  - (b) How does silt differ from clay ?
  - (c) What is kerogene ?
  - (d) What is meant by geologic clocks ?
  - (e) What is 'dip' and 'strike' of a bed ?
  - (f) What is clarain ?
  - (g) What is unconformity ?
  - (h) Name two major and two minor plates of the world.

[ Turn Over ]

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

(a) Write about the miofloristics of Raniganj formation in Damodar valley basin. Mention the age of the Formation. 4+1

(b) Write a short note on stromatolites. 5

(c) Describe the early life forms recovered from Gunflint Formation of Precambrian era. 5

(d) Write briefly about lithostratigraphy. 5

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

(a) What is meant by Gondwana sequence ? Write the basis of three fold classification of Indian Gondwana. Discuss about the megafloreal elements recovered from Sonvalley basin during Triassic age. 2+2+6

(b) Describe the megafloreal succession of the world during Siluro-Devonian period. 10

(c) What are pangaea and panthalassa ? Who coined those terms ? How folded mountain ranges like Alps, Himalayas formed on earth ? Write two major and two minor plates of earth's crust. 3+1+4+2

- (d) Define stratigraphy. How stratigraphic deductions can be worked out of an area ? How plant fossil elements help to correlate among the different local sections of a given area ? 2+3+5

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

**[Plant Physiology]**

1. Answer any *five* questions from the following : 2×5
- (a) What is the difference between oxygenic and anoxygenic photosynthesis ?
  - (b) Name two free living cyanobacteria involved in nitrogen fixation.
  - (c) Mention the role of antenna pigments in trapping solar radiation.
  - (d) What do you mean by stress avoidance and stress tolerance ?
  - (e) What is the major difference between active and passive transport ?
  - (f) What are ephemeral plants ?

[ Turn Over. ]

- (g) What do you mean by programmed cell death ?
- (h) What is meant by membrane potential ?
2. Write short notes on any *two* of the following :  $5 \times 2$
- (a) Process of nodule formation in leguminous plants.
  - (b) Ethylene induced gene expression related to fruit ripening.
  - (c) ATP generation in mitochondria.
  - (d) ABC transporters.
3. Answer any *two* of the following :  $10 \times 2$
- (a) Write a short note on membrane transport proteins. Briefly describe the ABC model of flowering response.  $4+6$
  - (b) Enumerate the stress inducible response in plants against herbivores and pathogens.  $5+5$
  - (c) Discuss about the protein and polypeptide components of photosystem II. What do you mean by dual role of RUBISCO ?  $7+3$
  - (d) Describe the biosynthetic pathway of Gibberellic acid. Discuss the role of GAs in seed germination.
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