2016

BOTANY

(Major)

Paper : 5.1

(Microbiology and Immunology)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following as directed : 1×7=7

(a) Robert Koch postulated the Germ Theory of Disease based on his studies on the _____ disease of animals.
(Fill in the blank)

(b) What are psychrophilic micro-organisms?

(c) Name the group of Archaeobacteria which produces methane anaerobically.

(d) What is BOD?

(e) Name the enzyme found in the root nodule of leguminous plants.

(f) _____ is the major circulating antibody in animals.

(Fill in the blank)

(g) The infectious protein which causes the neurological disease called 'scrapie' in sheep is termed as _____.

(Fill in the blank)

2. Write briefly on any *four* of the following : 2×4=8

(a) Rickettsiae

(b) Fermentation

(c) Antigen

(d) Virusoids

(e) Aerobiology

3. Answer any *three* of the following questions : 5×3=15

(a) "Bacterial growth is said to be synonymous to reproduction." Explain.

(b) Write a note on the scope of microbiology.

(Continued)

(c) Why are viruses said to be an intermediate stage between living and non-living? Explain.

(d) In the microbiological context, discuss briefly about the different types of water pollution.

(e) What is the role played by microbes in Bioremediation and Bioleaching? Give suitable examples in each case.

(f) Write a note on the different groups of microbes, classified on the basis of the method of ATP generation.

4. Answer the following questions :

(a) "Microorganisms form various physical associations with different organisms, including other microbes." Write a note on such associations, giving suitable examples. 10

Or

"Griffith's transforming principle was DNA." Which type of bacterial reproduction does this sentence refer to? Explain. How does the cell wall of Gram +ve bacteria differ from that of Gram –ve bacteria? 6+4=10

(b) What is a biogeochemical cycle? Give a detailed account of cycling of elemental sulphur in nature. Mention the microorganisms involved in each step. 1+9=10

Or

What are 'nod' and 'nif' genes? Explain the process of formation of root nodules and the biochemistry of nitrogen fixation in these nodules. 2+8=10

(c) What is cellular immunity? Explain the role of T-lymphocytes in cellular immunity. 2+8=10

Or

Define 'specific resistance'. Explain in detail how antibodies interact with antigens to develop specific resistance. 2+8=10

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2016

BOTANY

(Major)

Paper : 5·3

(Cytogenetics, Plant Breeding and Biometrics)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Choose and write the correct answer : 1×7=7

   (a) Heterosis is

   (i) appearance of spontaneous mutations

   (ii) mixture of two or more traits

   (iii) induction of mutations

   (iv) superiority of hybrids over their parents

   (b) The testcross ratio in complementary gene action is

   (i) 3 : 1

   (ii) 1 : 3

   (iii) 1 : 2 : 1

   (iv) 2 : 1 : 1

(c) Pure line breed refers to

(i) heterozygosity only

(ii) homozygosity only

(iii) homozygosity and self-assortment

(iv) heterozygosity and linkage

(d) Multiple effects of a single gene are known as

(i) polyploidy

(ii) heteroploidy

(iii) pleiotropy

(iv) None of the above

(e) Which of the following is not a mean of central tendency?

(i) Mean

(ii) Mode

(iii) Range

(iv) Median

(f) The ratio often referred to the Mendelian ratio is

(i) 1 : 3 : 3 : 1

(ii) 9 : 7

(iii) 1 : 3 : 1

(iv) 3 : 1

(g) The genotype of an individual with Turner syndrome is

(i) YO

(ii) XXY

(iii) XYY

(iv) XO

2. Answer the following questions : 2×4=8

(a) Define inbreeding depression.

(b) What do you mean by three-point test-cross?

(c) What is chi-square test?

(d) Mention the evolutionary significance of polyploidy.

3. Answer any *three* of the following questions : 5×3=15

(a) What are gene interactions? State the three main types of gene interaction.

(b) Briefly explain the applications of heterosis in plant breeding.

(c) Describe the Mendel's dihybrid experiments with suitable example.

(d) Write on the significance of crossing-over.

4. *(a)* Explain the Hardy-Weinberg equilibrium theory with example. 10

Or

Define standard deviation with mathematical formula. Also mention its importance in plant breeding. 10

(b) Define sex chromosomes. What are the differential and non-differential regions of XY-chromosome? Describe the genic balance theory of sex determination in *Drosophila*. 2+3+5=10

Or

Define crossing-over. How does it differ from chiasma? Describe in detail the cytological basis of crossing-over with a suitable example. 2+2+6=10

(c) Explain the mode of action of physical mutagens. State the application of mutations in plant breeding. 5+5=10

Or

What is chromosome inversion? Explain different types of chromosomal inversion with schematic diagrams. Write the significance of inversion. 2+6+2=10

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2016

BOTANY

(Major)

Paper : 5.4

(Applied Botany)

Full Marks : 60

Time : 3 hours

The figures in the margin indicate full marks for the questions

1. Answer the following : 1×7=7

(a) IAA was first isolated from _____.

(b) Yeast cells are the best sources of _____.

(c) Azotobacter is a _____ nitrogen fixing bacteria.

(d) Plant diseases which occur throughout the globe is called _____.

(e) _____ is the most suitable for virus-free plants for micropropagation.

(f) Agar-agar is extracted from _____.

(g) IPCC stands for _____.

2. Write brief notes on the following : 2×4=8

(a) Pure line selection

(b) Bonsai

(c) Allergens

(d) BGA

3. Write notes on any *three* of the following : 5×3=15

(a) Importance of phytoremediation

(b) Need of grafting in horticulture

(c) Lichen as pollution indicator

(d) Algae as fish feed

(e) Importance of PGPRS

4. Answer any *three* of the following : 10×3=30

(a) Give an account on the role of algae in agriculture.

(b) What is mycorrhiza? Elucidate its role in plant growth and development.

(c) What is India's contribution in global climate change concept?

(d) Write an essay on the application of synthetic regulators in agriculture.

(e) Write a note on the recent initiatives of crop improvement undertaken by ICAR.

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