104

Microbiology / Biotechnology

TIME : **3** HOURS

MAXIMUM MARKS : **300**

INSTRUCTIONS :

1. *All questions are **compulsory**.*
2. *Question Paper may be divided into **4 (four)** Sections from **Section-A** to **Section-D** and carry marks as under :*
   - **a.** ***Section - A** - Total **3** Questions having **two** parts, i.e. **(a) and (b)** each questions carries **12** marks × 3 Questions = Total **36** Marks.*
   - **b.** ***Section - B** - Total **3** Questions having **two** parts, i.e. **(a) and (b)** each questions carries **20** marks × 3 Questions = Total **60** Marks.*
   - **c.** ***Section - C** - Total **3** Questions having **two** parts, i.e. **(a) and (b)** each questions carries **28** marks × 3 Questions = Total **84** Marks.*
   - **d.** ***Section - D** - Total **3** Questions having **two** parts, i.e. **(a) and (b)** each questions carries **40** marks × 3 Questions = Total **120** Marks.*

SECTION - A

(Each question is of **12** marks and each sub part **(a)** and **(b)** are of **6** marks each)

1 (a) What is Pandora and Panacea concept of disease and how it is evolved into Germ theory of disease.

(b) Differentiate between sterilization, tyndallization and pasteurization.

2 (a) What are the relative merits and demerits of using gold and tungsten particles for biolistic transformation of plant cells ?

(b) Briefly describe the characteristic features of antigens.

3 (a) What do you understand from cellular and humoral immunity.

(b) Differentiate between insertion sequences and composite transposons giving suitable examples.

SECTION - B

(Each question is of **20** marks and each sub part **(a)** and **(b)** are of **10** marks each)

4 (a) Enlist various physical agents for control of microorganisms with specific reference to heat.

(b) What is Iceberg concept of disease ? Explain the importance of portal of entry in causing and establishing the disease.

5 (a) How will you exploit the selective interaction between certain metal ions and amino acids for purification of the recombinant proteins ?

(b) How can you synthesize an array of peptides on a glass slide ?

6 (a) Describe rhizosphere effect. What are the factors responsible for such an act ?

(b) How will you differentiate between competitive and non competitive enzyme inhibition ?

SECTION - C

(Each question is of **28** marks and each sub part **(a)** and **(b)** are of **14** marks each)

7 (a) When you are simply staining a bacterial cell suspension of *Staphylococcus aureus* or *Bacillus subtilis* with crystal violet or safranin, they appear purple or reddish pink depending on the dye but when you stain the suspension with nigrosin or congo red they do not show any color. Explain why ?

(b) How will you prove experimentally that transformation may not require cell to cell contact ?

8 (a) How will you prove that phosphofructokinase reaction in glycolysis is a major regulated step in the intact cells ?

(b) Why and how RAPD can be used for differentiating the different genotypes and for developing STS markers ?

9 (a) Describe the microbial growth curve in a batch culture giving a well illustrated diagram.

(b) What are the molecular events that take place during the transfer of T-DNA from *Agrobacterium tumefaciens* to plants after induction of the virulence genes ?

SECTION - D

(Each question is of **40** marks and each sub part **(a)** and **(b)** are of **20** marks each)

10 (a) Describe the different stages of life cycle of Lambda bacteriophage. List the factors responsible for switching over from lysogenic to lytic phase.

(b) Differentiate parasitism from predation. Do fungi act as predators? If so, what mechanisms are adopted for the process.

11 (a) Discuss in detail the pathways for antigen processing and presentation by MHC-I and MHC-II for cell-mediated immune response.

(b) A mutation occurs in coding region of a gene that codes for a stable protein in *E. coli*. The mutated gene can be transcribed into mRNA that has the correct initiation codon (translation initiation can occur) but lacks termination codon in any reading frame. Would the incorrect protein be synthesized from this mRNA and accumulate in the cell ? Explain your answer.

12 (a) Elucidate the different steps involved in synthesis of folic acid in plants. How can you exploit this information to enhance the amount of folic acid in transgenic crops ?

(b) Describe the process for microbial production of beer at industrial level.
