

**B.Sc. MICROBIOLOGY
FOURTH SEMESTER
MICROBIAL GENETICS
BMB-401**

**SET
A**

[USE OMR SHEET FOR OBJECTIVE PART]

Duration: 3 hrs.

Full Marks: 70

(Objective)

Time: 30 mins.

Marks: 20

Choose the correct answer from the following:

1 × 20 = 20

1. Damage and errors in DNA cause.....
 - a. Mutation
 - b. DNA repair
 - c. Translation
 - d. Transcription
2. Which of the following is NOT true for loss of function mutation?
 - a. Usually recessive
 - b. Most common mutation
 - c. Increases the activity of the gene
 - d. Null allelic mutation
3. Which of the following chemical mutagen affects only replicating DNA?
 - a. Acridine dye
 - b. Alkylating agent
 - c. Deaminating agent
 - d. Base analog
4. Which of the following is NOT true for a plasmid?
 - a. Contains an origin of replication
 - b. Imparts a useful characteristic to the host bacterium
 - c. Possesses one or more genes
 - d. Replicates only when the host genome is undergoing replication
5. How can conjugative and non-conjugative plasmids be differentiated?
 - a. On the basis of size
 - b. Presence of antibiotic resistance
 - c. Number of cloning and digestion sites
 - d. Presence of transfer genes
6. How the plasmid clones can be screened?
 - a. By selectable markers
 - b. By bacterial resistance gene
 - c. For restriction site
 - d. By ARS sequence
7. How many restriction sites plasmids may contain?
 - a. 1
 - b. 2
 - c. 3
 - d. More than 1
8. If the plasmid and the foreign DNA are cut by the same restriction endonuclease, recombinant DNA can be formed by joining both by:
 - a. Polymerase III
 - b. EcoRI
 - c. Ligase
 - d. Taq polymerase
9. Bacterial recombination causes transformation of the recipient cell to.....
 - a. Donor cell
 - b. Merozygote
 - c. Zygote
 - d. Recipient cell

10. The cell in which the F factor carries along with it some chromosomal genes are known as:
 a. F+ cell
 b. F- cell
 c. F' cell
 d. F'' cell
11. The transfer of naked DNA from one cell to another is referred to as.....
 a. Transduction
 b. Lysogeny
 c. Transformation
 d. Conjugation
12. Which of the following is not true for a bacteriophage?
 a. A very simple structure
 b. Consist either DNA or RNA
 c. Bacteriophages are viruses
 d. Complex structure that infects bacteria
13. Which of the following is an example of head-and-tail bacteriophage?
 a. M13
 b. Lambda phage
 c. Pbr322
 d. M16
14. Which is a reason of instability of phage DNA molecule in the host cell in a lytic cycle?
 a. The huge size of phage DNA
 b. Inability of replicative enzymes
 c. Immediate synthesis of capsid
 d. Lytic cycle inefficiency
15. Which infection cycle is characterized by retention of the phage DNA molecule in the host bacterium for many thousands of cell division?
 a. Lysogenic cycle
 b. Lytic cycle
 c. Integrative Phase
 d. Protein synthesis
16. The IS elements can be identified by the presence of.....
 a. Antibiotic resistance gene
 b. Endonuclease cleavage site
 c. 50 bp inverted repeat
 d. Integrase site
17. The direct repeat within the IS element has a length of.....
 a. 20 bp
 b. 11-15 bp
 c. 5-11 bp
 d. 3-7 bp
18. Transposase restriction mechanism of IS element restricts the transposon and the target DNA in a combination of which of the following?
 a. Blunt end cut for transposon and sticky end cut for target DNA
 b. Blunt end cut for both transposon and target DNA
 c. Sticky end cut for transposon and blunt end cut for target DNA
 d. Sticky end cut for both transposon and target DNA
19. Which of the following is a non-composite transposon?
 a. Tn5
 b. Tn10
 c. Tn3
 d. Tn9
20. The central block of the composite transposable element consists a gene for.....
 a. Transposase
 b. Antibiotic resistance
 c. Integrase
 d. Lactamase

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(Descriptive)

Time : 2 hr. 30 mins.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. Explain the mechanism of specialized Transduction with a neat diagram. Explain with reference to LFT & HFT lysates. 10
2. Describe HFR conjugation with a neat diagram. 5+5=10
Genetic distance is determined by comparing their times of entry during an interrupted mating experiment. LAC Z and Gal E entered at 16 min and 25 min respectively, find out the difference of time in entry with a neat diagram.
3. Explain the mechanism of phage genetics with reference to lytic and lysogenic switch. 10
4. Define mutation. Explain the various types of mutation. Describe the mode of spontaneous mutation with a neat diagram. 2+4+4=10
5. Explain the mechanism of induced mutation with reference to base analog. Explain Ames Test with a neat diagram. 10
6. How can you define plasmids? What is the role of plasmids in bacteria? Explain in your own words. Explain the modes of plasmid replication in bacteria. Which one do you think takes place during the transfer of plasmid to other bacterial cells? 1+2+5+2=10
7. Define copy number. What are the different types and what is the significance of maintaining copy number? What is the difference between competent and non-competent plasmids? Which one according to you is important in recombination in bacterial population? Justify your answer. Explain the genome organisation of *E.coli*. 1+2+2+1+4=10
8. What is the importance of plasmids to a bacterium? What is the importance of Ti plasmid to bacteria? Explain the organization of Ti plasmid. How many copy number/s are usually maintained for F plasmid? What is the importance and organization of F plasmid? What is linear plasmid and how it is different from other plasmids? 2+1+2+1+3+1=10

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