



ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27
M.Sc MICROBIOLOGY- I SEMESTER
SEMESTER EXAMINATION- OCTOBER 2019
MB7318- MICROBIAL GENETICS

Register Number:

DATE:

Time: 2 ½ hrs Max Marks: 70

This question paper has 2 printed pages and 4 parts.

I. Answer any Five of the following

5X3 =15

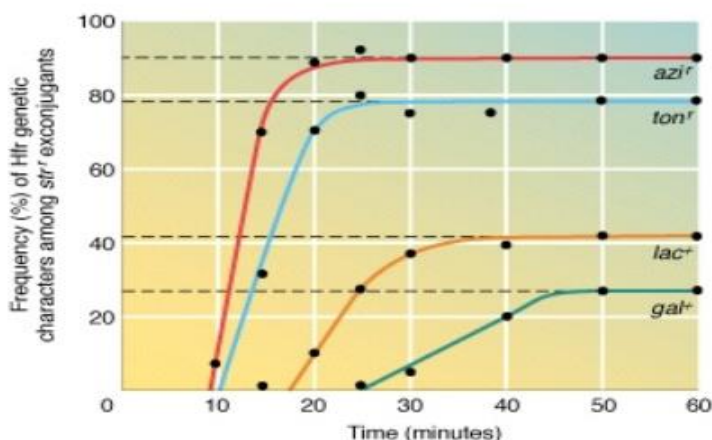
1. Give an example and mode of action of one biological, one chemical, and one physical mutagen.
2. Differentiate between mini satellite and micro satellite.
3. Explain why an *Escherichia coli* strain that is His⁻ is an auxotroph and one that is Lac⁻ is not.
4. Few bacteria survive in a landfill area heavily polluted with petroleum distillation products and medical waste list the various plasmids that these bacteria could possess.
5. Differentiate between B and Z forms of DNA.
6. Define: (i) Copy Number (ii) Transformation efficiency (iii) Transversion
7. What are the structural features of composite transposons.

II. Answer any Five of the following

5x5= 25

8. Explain the Life cycle of M13 phage.
9. In an interrupted mating experiment a cross between Hfr and F⁻ was performed,
Hfr : str-s, azi-r, ton+, lac+, gal-r.
F⁻:str-r, azi-s, ton-, lac-, gal-s.

Upon plating the recombinants on streptomycin media the following data was obtained. Use the data given to map the genes and calculate their distance.



10. What environmental factors trigger a SOS repair and how does this mechanism work?
11. What is the significance of linking difference? Write the mathematical relation between linking number and linking difference?
12. Differentiate between generalized and specialized transduction with the help of diagrammatic illustrations.
13. Explain the experiment that proposed RNA as a genetic material.
14. Diagrammatically depict Homologous recombination.

III. Answer any Two of the following

2x10 =20

15. Explain the mechanisms of various types of site specific recombination.
16. Explain the process of replication in a circular prokaryotic chromosomal DNA.
17. Describe how AMES test is performed. Why does the AMES test measure the rate of back mutation rather than the forward mutation?

IV. Answer the following

1x10 = 10

18. (i) The melatonin receptor exists in different isoforms: MT1, encoded by MT-1 gene and MT2, encoded by MT-2 gene. The following is the sequence corresponding to 90-140 base pairs (bp) of MT-1 and MT2 genes.

MT-1: 90

140bp

5'-----GATATGCCCCCCCCGGCGCGCGATATGCCCCCCCCGGCGCGCGCGTGCCTGA-----3'
 3'-----CTATACGGGGGGGGCCGCGCGCTATACGGGGGGGGCCGCGCGCACGGGCACT-----5'

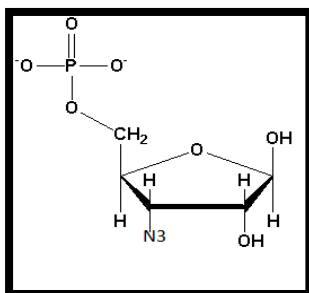
MT-2: 90

140bp

5'-----GATATGATATATATATATATAGATATGAAAAATTTTTATATAGTGCTTTTTTAAATGA-----3'
 3'-----CTATACTATATATATATATATCTATACTTTTTAAAAAATTATCACGAAAAATTTCACT-----5'

- a. Which of the above sequence will denature at lower temperature and why?
- b. Design an experimental setup that will help you study the renaturation of these sequences in high salt concentration. (2+3)

- (ii) Study the image and answer the following:



- c. Draw the image on the answer sheet and circle the group involved in condensation reaction that joins two such molecules.
- d. Which nucleic acid will the molecule in the diagram be a part of and why?
- e. If this molecule is a part of the terminal nucleotide of a growing polymer could it form a phosphodiester bond with an incoming nucleotide (Yes/No)? Explain why you selected this option. (1+2+2)