


Name:			
Enrolment No:			
UPES End Semester Examination, May 2024			
Course: Microbial Genetics Program: Int BMSC Microbiology-VI Course Code: HSMB3017		Semester : VI Duration : 3 Hours Max. Marks: 100	
Instructions: Attempt all questions as per instructions given in each section.			
S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
Q 1	A point mutation involves: a) Insertion or deletion of a nucleotide b) Substitution of one nucleotide for another c) Rearrangement of chromosomal segments d) Duplication of a chromosomal region	1.5	CO1
Q2	The lytic cycle of bacteriophages includes? a) The cycle in which the phage DNA integrates into the host genome b) The cycle in which the infected host cell bursts, releasing new phages c) The cycle in which the phage remains dormant within the host cell d) The cycle in which the phage undergoes replication without causing cell lysis	1.5	CO3
Q3	State out the following techniques utilizes bacteriophages? a) Polymerase chain reaction (PCR) b) CRISPR-Cas9 gene editing c) Western blotting d) Phage therapy	1.5	CO2+3
Q4	Identify the process that bacteriophages use to inject their genetic material into a bacterial cell? a) Binary fission b) Conjugation c) Transduction d) Lysogeny	1.5	CO4
Q5	Find out the bacterial genetic analysis techniques that allows for the identification of bacterial strains based on DNA sequence variations? a) Restriction fragment length polymorphism (RFLP) b) Polymerase Chain Reaction (PCR) c) Western blotting d) Gel electrophoresis	1.5	CO3+4

Q6	A bacteriophage that has a lytic lifecycle, leading to host cell lysis and release of progeny phages? a) T4 phage b) T7 phage c) Lambda phage d) Both T4 and T7 phages	1.5	CO4
Q7	Identify the bacterial species that is commonly used to study conjugation? a) Escherichia coli b) Bacillus subtilis c) Staphylococcus aureus d) Pseudomonas aeruginosa	1.5	CO3
Q8	The switch from the lysogenic to the lytic cycle in lambda phage is triggered by: a) Activation of the cI gene b) Activation of the Cro gene c) Activation of the lysozyme gene d) Activation of the integrase gene	1.5	CO3+4
Q9	Transposons move within the bacterial genome by a mechanism known as: a) Transformation b) Transduction c) Conjugation d) Transposition	1.5	CO4
Q10	Lambda phage can undergo: a) Lytic cycle only b) Lysogenic cycle only c) Both lytic and lysogenic cycles d) None of the above	1.5	CO2
Q11	Hfr (high frequency of recombination) strains of bacteria have the F plasmid: a) Integrated into their chromosome b) Replicating independently c) Absent d) Circularized in the cytoplasm	1.5	CO2
Q12	Identify that the following is an example of a bacterial transposon? a) F plasmid b) Tn5 c) CRISPR-Cas9 d) Lac operon	1.5	CO4
Q13	Recognize the techniques that is commonly used for genetic analysis of bacteria? a) Polymerase Chain Reaction (PCR) b) Southern blotting c) Western blotting d) Gel electrophoresis	1.5	CO3+4

Q14	Distinguish the bacterial genetic elements that is commonly used as a cloning vector? a) Plasmid b) Ribosome c) Transposon d) Exon	1.5	CO2
Q15	The process that allows bacteria to transfer plasmids to other bacteria is called as? a) Transformation b) Conjugation c) Transduction d) Transcription	1.5	CO2+3
Q16	The primary advantage of using bacterial genetics in research and biotechnology is? a) Bacteria are easy to culture and manipulate in the laboratory. b) Bacterial genomes are more complex than those of eukaryotic organisms. c) Bacteria exhibit fewer genetic variations compared to other organisms. d) Bacterial cells have limited potential for genetic modification.	1.5	CO3
Q17	The Ames test utilizes: a) Bacterial conjugation b) Bacterial transformation c) Bacterial transduction d) Bacterial recombination	1.5	CO4
Q18	Label the techniques that is commonly used to detect point mutations in bacterial DNA? a) Polymerase Chain Reaction (PCR) b) Southern blotting c) DNA sequencing d) Gel electrophoresis	1.5	CO3
Q19	Find out the techniques that allows for the direct visualization of DNA fragments after gel electrophoresis? a) Southern blotting b) Northern blotting c) Western blotting d) Reverse blotting	1.5	CO3+2
Q20	Ames test is a widely used method for detecting: a) Frameshift mutations b) Silent mutations c) Point mutations d) Insertion mutations	1.5	CO2+1
Section B (4Qx5M=20 Marks)			
Q 1	Summaries complementation tests as discussed in the class.	5	CO2+4
Q2	Distinguish between reversion versus suppression mutations.	5	CO2

Q3	Describe the influence of cI and Cro genes on decision-making processes of bacteriophages.	5	CO3+4
Q4	Draw the genomic structure of T7 bacteriophage and label it as discussed in the class.	5	CO3
Section C (2Qx15M=30 Marks)			
Q 1	Outline major types of natural genetic recombination in bacteria. Explain conjugation mechanism (<u>genes and proteins involved in this process</u>) in detail.	15	CO2+3
Q2	Describe T4 life cycle and create its structure. A diagram should show various stages of T4 life cycle as discussed in the class.	15	CO4
Section D (2Qx10M=20 Marks)			
Q 1	Explain transposon and describe various Classes of bacterial transposons. Or Distinguish between Generalized and specialized transduction with description and diagram as discussed in the class.	10	CO4+3
Q2	Define both lytic and lysogenic cycle of a bacteriophage. Provide individual figures.	10	CO3+2