JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
TEST -1 EXAMINATION- 2026
M.Sc.III Semester (Microbiology)

COURSE CODE (CREDITS):24MS1MB311 (03) MAX. MARKS: 15
COURSE NAME: Microbial Genetics and Physiology
COURSE INSTRUCTOR: Dr Anil Kant MAX. TIME: 1 Hour

Note: *(a) All questions are compulsory. (b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems (c) Use of calculator is not allowed*

Q.No	Question	Marks
Q.1	a. Explain i) carbon source mutants ii) prototroph and auxotroph. b. Illustrative with examples how genotype and phenotype are designated in bacterial genetics. c. How is monoploid different from haploid? d. The term Gene was originally proposed by Wilhelm Johannsen in 1909., State what physical or chemical properties of the gene were left unspecified in his definition. e. What would be the outcome of a single or odd-numbered and double crossover during bacterial gene transfer, and why? f. What are heteroduplexes and how are they formed during transformation?	0.5x6=3.0
Q.2	**Attempt any two of following** A. Critically evaluate the biological and practical properties that make bacteria and bacteriophages advantageous for genetic analysis, compared with eukaryotic model organisms. B. Appraise state of the 'gene concept' immediately before the discovery of DNA as the genetic material C. You transform a recipient strain of genotype x- y- z- with wild-type donor DNA and screen for transformants. You recover x+y+ and y+z+ double transformants at appreciable frequency, but essentially no x+z+ double transformants. With full reasoning, determine whether these three mutations are closely linked, and if so, deduce their order on the bacterial chromosome.	2x2.0=4.0
Q.3	Perform a critical comparison of the three distinct modes of bacterial gene transfer conjugation, transduction, and transformation specifically analyzing i) requirement of cell contact ii)delivery pathway iii) sensitivity to DNase. Explain U tube experiment which can be used to figure out the mode of gene transfer?	4.0
Q.4	Describe in detail the molecular mechanism of transformation in *Bacillus subtilis*, including naming of competence genes and their role, and draw suitable diagrams to illustrate steps involved.	4.0

JUIT EXAMINATION-AUG-2026