

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATIONS-2024

M.Sc. 2nd Semester Microbiology

COURSE CODE (CREDITS): (21MS1MB212)

MAX. MARKS: 35

COURSE NAME: MICROBIAL GENETICS AND PHYSIOLOGY

COURSE INSTRUCTORS: Ashok Kumar Nadda

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

Section I

Q1 Very short answer type questions. Each question is carrying one mark.

- (a) What is the role of the enzyme transposase in DNA transposons? [Mark 1]
- (b) What is the role of lactic acid in the fermentation process? How do lactic acid bacteria ferment carbohydrates? [Mark 1]
- (c) What are the conditions required for transformation to occur? How is transformation used in genetic engineering? [Mark 1]
- (d) How do batch culture and continuous culture differ in terms of nutrient utilization and waste accumulation? [Mark 1]
- (e) Why is regulation of gene expression important in prokaryotes? Give an example too. [Mark 1]

Section II

Q 2 How do microorganisms sense and respond to oxidative stress and changes in osmotic pressure? [Marks 03]

Q 3 What is the SOS response in bacteria? How do microorganisms respond to the presence of antibiotics? [Marks 03]

Q 4 What is the role of coenzyme A (CoA) in fatty acid metabolism in microbes? How do anaerobic conditions affect fatty acid metabolism in microbes? [Marks 03]

Q 5 What are the adaptive advantages of producing branched-chain fatty acids in microbes? How does the presence of fatty acids affect microbial membrane composition? [Marks 03]

Q 6 How do quorum sensing systems differ between Gram-positive and Gram-negative bacteria? How do bacteria detect quorum sensing signals? [Marks 03]

Section III

Q 7 What mechanisms do microorganisms use to maintain pH homeostasis under alkaline conditions? How do microorganisms adjust their metabolism in response to acidic conditions? [Marks 05]

Q 8 Answer the followings:

- a) In a yeast cell recessive allele has frequency of 0.44; calculate the frequency of homozygous dominant, heterozygous and homozygous recessive yeast cells. [Marks 03]
- b) What are the conditions in which allele frequencies remain similar from one generation to another? [Marks 02]

Q 9 Answer the followings:

- a) Conjugation and Transformation are ways of bacterial reproduction. What are the primary differences between these two modes? [Marks 03]
- b) Elucidate differences between Covishield and Covaxin genetic basis of manufacturing. [Marks 02].