

**JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT**

**TEST -3 EXAMINATIONS-2022**

M.Sc. IInd Semester (Microbiology)

COURSE CODE (CREDITS): 21MS1MB212

MAX. MARKS: 35

COURSE NAME: Microbial Genetics and Physiology

MAX. TIME: 2 Hours

COURSE INSTRUCTORS: Dr. Ashok Kumar Nadda and Prof. Sudhir Kumar

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*Note: All questions are compulsory. Marks are indicated against each question in square brackets.*

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**Section –I**

**Q 1 Answer the following questions. Very short answer type questions.**

- A dormant, tough structure made by some bacteria that allows the bacteria to survive during unfavourable condition, such as intense heat, disinfectant and even UV radiation is known as \_\_\_\_\_. [01 Marks]
- The acetone-butanol-ethanol (ABE) fermentation by \_\_\_\_\_ is one of the oldest known industrial fermentations. [01 Marks]
- A process of bacterial cell-to-cell communication involving the production and detection of extracellular signaling molecules is called as \_\_\_\_\_. [01 Marks]
- \_\_\_\_\_ is non productive period in the industrial fermentations that need to minimize to improve the process sustainability. [01 Marks]
- Lithotrophs oxidize inorganic compounds for energy and reducing power and are usually lithoautotrophs, obtaining carbon by fixing \_\_\_\_\_. [01 Marks]

**Section –II**

**Answer the following questions. Short answer type questions.**

**Q 2** For the bacteria to use quorum sensing constitutively, they must possess some unique characteristics. What are these characteristics and physiological activities possessed by the microbes during signaling with each other? [03 Marks]

**Q 3** With the help of suitable examples writes a brief account of nitrogen oxidizers and annamox bacteria. What are their roles in maintaining the balance in ecosystem? [03 Marks]

**Q 4** With the help a suitable diagram discuss the various stages in the spore formation. Draw the schematic diagram to describe the various components in the spore structure. [04 Marks]

### Section –III

Answer the following questions. Long answer type questions.

**Q 5** The primary fermentation pathways including acrylate and Wood-Werkman cycle involved in the production of an important organic acid using microbial fermentation. With the help of suitable diagram discuss the various microbes and basic steps in these fermentation pathways. [05 Marks]

**Q 6** Calculate the change in p and q after one generation if

a)  $p=0.5$  and  $q=0.5$

b)  $p=0.8$  and  $q=0.2$

In both the cases the following are the values of fitness –

$W_{11} = 1.5$

$W_{12} = 1.0$

$W_{22} = 0.5$

[05 Marks]

**Q 7** Lactic acid and butyric acid are used widely in the industries. Illustrate the various applications of the butyric acid and lactic acid in the various industries. [05 Marks]

**Q 8** Why do most mutations are neutral? Explain with the help of examples.

Comment upon Yeast Mating Switch.

[3+2 Marks]