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NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: III THEORY EXAMINATION (2022-2023)

Subject: **Cell Biology and Microbiology**

Time: 3Hours

Max. Marks:100

General Instructions:

**IMP:** Verify that you have received question paper with correct course, code, branch etc.

1. This Question paper comprises of three Sections -A, B, & C. It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.
2. Maximum marks for each question are indicated on right hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

## SECTION – A

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1. Attempt all parts:-

- 1-a. Which of the following is the main site for synthesis of glycolipids and glycoproteins in addition to packaging of proteins? (CO1) 1
- (a). Endoplasmic reticulum
  - (b). Golgi apparatus
  - (c). Ribosomes
  - (d). Lysosomes
- 1-b. Which of the following bacteria lacks cell wall? (CO1) 1
- (a). *Helicobacter pylori*
  - (b). *Bacillus subtilis*
  - (c). *Mycoplasma pneumoniae*
  - (d). *Staphylococcus aureus*
- 1-c. The cell junction that forms a connection between cells such as in the cardiac cells is known as – (CO2) 1
- (a). Tight junction
  - (b). Desmosomes
  - (c). Focal adhesions
  - (d). Gap junctions
- 1-d. During which stage of the meiotic cell division so the sister chromatids separate? (CO2) 1
- (a). Metaphase I
  - (b). Metaphase II

- (c). Anaphase I  
(d). Anaphase II
- 1-e. Bacteriophages that cause bacterial cell lysis are termed as - (CO3) 1  
(a). Lysogenic phages  
(b). Prophages  
(c). Virulent phages  
(d). Temperate phages
- 1-f. Cocci which form a bunch and irregular pattern are classified as -(CO3) 1  
(a). Staphylococci  
(b). Diplococci  
(c). Tetrads  
(d). Streptococci
- 1-g. Bioremediation is defined as the - (CO4) 1  
(a). use of microbes to create new organisms with new properties  
(b). use of anaerobic bacteria to create new antibiotics or vaccines  
(c). use of microbes to destroy environmental pollutants  
(d). use of aerobic bacteria to create new compounds
- 1-h. Which of the following is the most common source of Single Cell Proteins? (CO4) 1  
(a). Multicellular yeast  
(b). Single-celled yeast  
(c). Unicellular algae  
(d). Unicellular bacteria
- 1-i. Which of the following diseases does not spread by fomite transmission? (CO5) 1  
(a). Influenza  
(b). Common cold  
(c). AIDS  
(d). Ringworm
- 1-j. Out of all the statements enlisted below about active and passive immunization, which is incorrect? (CO5) 1  
(a). Active immunization is the inoculation of live, attenuated and dead pathogens  
(b). Administration of preformed antibodies in the form of passive immunization  
(c). Both can occur naturally as well as artificially  
(d). Both types of immunization may provide long-term protection to the immune system
2. Attempt all parts:-
- 2.a. What does the cell theory state? (CO1) 2
- 2.b. What is the significance of the interphase during a cell cycle? (CO2) 2
- 2.c. What are the basic nutritional requirements for microbial growth? (CO3) 2
- 2.d. Give any four examples of industrially important micro-organisms. (CO4) 2
- 2.e. Define toxoid. Also give an example. (CO5) 2

#### SECTION – B

3. Answer any five of the following-

- 3-a. With the help of a well-labelled diagram explain the structure and functions of the cell nucleus. (CO1) 6

- 3-b. Draw a labelled diagram of a prokaryotic cell and mention the function of each organelle. (CO2) 6
- 3-c. What are the different types of microorganisms? Explain with suitable examples. (CO3) 6
- 3-d. Define microbial metabolites. Discuss the industrial application of secondary metabolites of microbes. (CO4) 6
- 3-e. Distinguish between benign and malignant tumors. Briefly describe the major types of carcinogens that lead to the development of cancer. (CO5) 6
- 3-f. Illustrate the structure of a virus highlighting its characteristic features. Also, discuss briefly the classification of viruses based on their capsid.(CO3) 6
- 3-g. Discuss the role of microbes in fermented food with an emphasis on prebiotics, probiotics, and synbiotics. (CO4) 6

#### SECTION – C

4. Answer any one of the following-

- 4-a. Draw the structure of a prokaryotic and eukaryotic cell. Also, tabulate the differences between the two. (CO1) 10
- 4-b. Mitochondria are designated as the powerhouse of the cell. Draw an illustrated diagram and discuss its role in the synthesis of ATP – the energy currency of the cell. (CO1) 10

5. Answer any one of the following-

- 5-a. Illustrate with the help of diagrams only, the stages of Meiosis I in a diploid cell with four chromosomes. Also, write the significance of meiosis. (CO2) 10
- 5-b. What are the different phases of microbial growth? Also, discuss the key events and critical conditions associated with each. Support your answer with a well-labelled diagram of the growth curve. (CO2) 10

6. Answer any one of the following-

- 6-a. What is a bacteriophage? Draw out the similarities as well as dissimilarities between the two major life cycle of bacteriophage. (CO3) 10
- 6-b. In microbiological studies, the preservation and sterilization of microbial cultures play a crucial role. Elaborate on the various ways employed for preservation and sterilization. (CO3) 10

7. Answer any one of the following-

- 7-a. For a better tomorrow, 17 Global Goals also known as the Sustainable Development Goals have been laid by United Nations. How do you think the significance of microbes in bioremediation and as biofertilizers can be a step towards the achievement of sustainability? (CO4) 10
- 7-b. Discuss the factors responsible for the distribution of microbes in the environment. Also, add a note on the bacteriological analysis of water samples for the presence of different microbes. (CO4) 10

8. Answer any one of the following-

- 8-a. Isolation, characterization, and studies related to transmission and infection due to microbial pathogens have been instrumental in the growth of medical microbiology as a discipline. Discuss. (CO5) 10

8-b. Define antimicrobials. Explain how they are used in the prevention of microbial diseases by giving relevant examples of each with special emphasis on Covid-19 infection. (CO5)

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