

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E.

Branch: Biotechnology

Course Code: 22BT3PCMBG / 19BT3DCMBG

Course: Microbiology

Semester: III

Duration: 3 hrs.

Max Marks: 100

Date: 12.05.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

- 1 a) A bacterial suspension consisting two different bacteria namely *Pseudomonas fluorescens* and *Bacillus subtilis*. While *B.subtilis* tends to accumulate phosphates as polyphosphates which turns into thick granules in cell, *Pseudomonas fluorescens* do not exhibit such property. The two organisms need to be observed and identified. **10**
 - i. Suggest specific and ideal light microscopes that could be used separately to observe and identify two bacteria. Justify for the selection of microscopes.
 - ii. Write the working principles of both the microscopes.
- b) "Most diseases are associated always with microorganisms". Substantiate the statement highlighting the contributions of physician in this field. **05**
- c) Two organisms are compared namely *E.coli* and *Penicillium notatum* considering number of characters. Both the organisms showed 10 similar characters present and 10 characters absent. While next 5 characters were present in *E.coli*, the same characters were absent in *Penicillium notatum*. And while next 7 characters were present in *Penicillium notatum*, the same characters were absent in *E.coli*. **05**
 - i. Place the values of a, b, c, d appropriately in a table corresponding to organisms in numerical taxonomy.
 - ii. Calculate the similarity coefficient and mention the extent of relatedness.

Is there any problem in the number of characters considered?

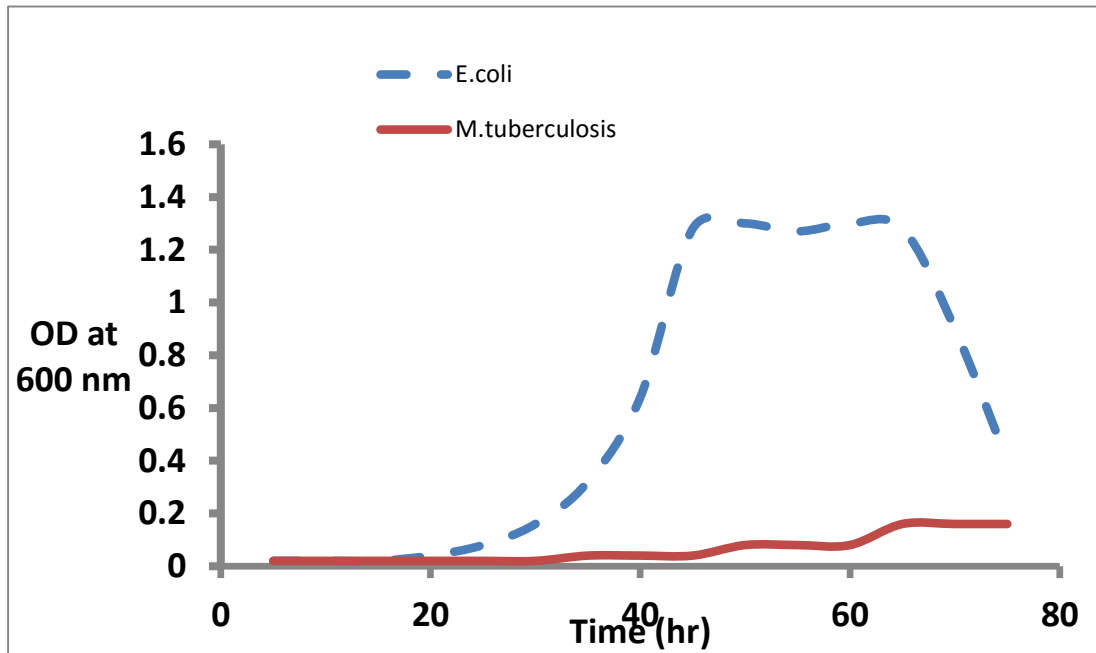
UNIT - II

- 2 a) You are provided with two organisms Lactic acid bacteria and *Rhizopus solani*. Both are provided as 100 mL cultures grown for 10 hours in respective physiological conditions. While first organism need to be quantified its growth and study its colony characters as well, the later organism need to be just quantified for its growth. **10**
 - i. Decide an ideal and specific technique of growth measurement and justify your decision.
 - ii. Give the principles of the techniques decided with their merits and demerits.
- b) Write an explanatory note on inclusion bodies found in a bacterial cell with respect to their characters and functions. **05**

- c) Groups of Bacteria represents wide range of temperature requirement'. Justify the statement with a neat graphical representation highlighting different groups of bacteria. **05**

OR

- 3 a) Consider the following growth curve and answer the following questions. **10**



- Label the different stages of the growth in both the organisms.
 - Infer with suitable reasons for the growth differences between two organisms.
 - How you can continue the growth phase of E.coli without allowing it to enter to another phase?
- b) Diagrammatically represent the cell wall of gram +ve bacteria and highlight its features. **05**
- c) Distinguish acidophiles from basophiles. Give the suitable examples under each with ecological habitats. **05**

UNIT - III

- 4 a) Give the general structures and the salient features of capsids found in following group of viruses. **10**
- Lambda phage
 - HIV
 - Plant infecting TMV
 - Human Adenoma virus
- b) The end product of the glycolysis is further processed by bacteria *Sachharomyces cerevisiae* and *E.coli*. Discuss the metabolites formed with their applications. **05**
- c) With a neat diagrammatic representation, explain the sexual reproduction in Ascomycetan fungi. **05**

OR

- 5 a) *Zymomonas mobilis* and *Lactobacillus acidophilus* were incubated in glucose broth. The glucose has been catabolised to yield pyruvate. Assuming that complete anaerobic environment is established during the next successive incubation, direct the metabolic pathway and comment on the end products. **10**
- b) Name and Illustrate the following bacterial processes with a neat diagram: **10**
- Genetic recombination in which a DNA fragment from a dead, degraded bacterium enters a competent recipient bacterium and it is exchanged for a piece of the recipient's DNA.
 - Genetic recombination in which a DNA fragment is randomly transferred from one bacterium to another by a bacteriophage.

UNIT - IV

- 6 a) Following biological samples, media, chemicals and glass wares are contaminated with different types of bacteria. **10**

Samples	Contaminated bacteria
a. Nutrient agar	<i>Bacillus licheniformis</i>
b. Empty Conical flasks and beaker	Psychrophilic bacteria
c. Vitamins, amino acids and few antibiotics	<i>Pseudomonas, E.coli</i>

- Design a suitable sterilisation technique that is sufficient to kill or remove these contaminants and mention their principle.
 - In case of sample a, how do you assess the efficiency of sterilisation technique?
- b) Describe the mechanism of action, concentration used and applications of phenol and phenolic compounds. **05**
- c) Discuss the mechanism of action of any one of the antibiotic acting on protein synthesis. **05**

UNIT – V

- 7 a) With a schematic representation, describe the role of microorganisms in recycling of nitrogen in an ecological environment. **10**
- b) Discuss *B.thuringiensis* as an eco-friendly pesticide for eradicating plant pests **05**
- c) Microbes play pivotal role in improving foods. Justify. **05**
