

Department of Biosciences and Bioengineering, IIT Guwahati
Microbiology (BT 206)

Mid Semester Exam, Date: 01.03.2023 Time: 9:00-11.00 AM

Total: 40 marks

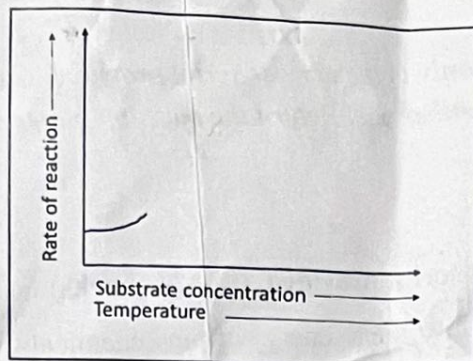
Name:.....Roll.....

Instructions: All answers must be written only in the answer script provided. Cutting and overwriting carry no marks for question number one. Return the question paper along with the answer script.

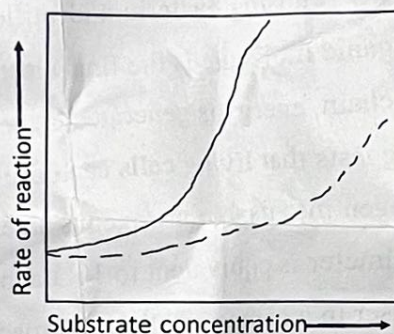
1. Write True or False in the answer script provided. (0.5×16 marks)

- ☐ a. The organisms which obtain their energy from chemicals are designated as chemotrophs.
- ☐ b. Embden described the chemical steps of the citric acid cycle in carbohydrate metabolism.
- ☐ c. *E. coli* was the first disease-causing bacterium identified by Koch.
- ☒ d. In fermentation, an inorganic molecule is the final electron acceptor.
- ☐ e. In the electron transport chain, energy is generated in the form of ATP by chemiosmosis.
- ☒ f. Theory of biogenesis suggests that living cells can only arise from preexisting cells.
- ☐ g. Fixation of gaseous nitrogen into usable nitrogen is an example of bioremediation.
- ☐ h. The metric unit of 1 centimeter is equivalent to 10^7 nanometers.
- ☐ i. The function of a condenser in a compound light microscope is to control the amount of light entering through the diaphragm.
- ☐ j. The total magnification of a compound microscope depends on both the ocular and objective lens.
- ☐ k. To achieve high magnification (1000×) with good resolution, the objective lens must be small.
- ☐ l. Differential interference contrast (DIC) microscopy uses the difference in refractive indexes of the sample and two light beams as the light sources.
- ☐ m. Bacteria are slightly positively charged at pH 7.
- ☒ n. Crystal violet is an acidic dye.
- ☐ o. To visualize a capsule of bacteria, negative staining is preferred.
- ☐ p. The flagellar proteins are denoted as O antigen.

- 2. An enzyme and substrate are combined. The rate of reaction begins as shown in the following graph. To complete the graph, show the effect of increasing substrate concentration on a constant enzyme concentration. Show the effect of increasing temperature. You can use single or separate graphs. (2 marks)



- 3. The following graph shows the normal reaction rate of an enzyme and its substrate (continuous line) and the rate when an excess of competitive inhibitor is present (discontinuous lines). Explain why the graph appears as it does. (2 marks)



4. Define and explain the importance of each of the following: (2 marks)
 - a. Endospore
 - b. Holoenzyme
 - c. Collision theory
 - d. Feedback inhibition
5. Differentiate between substrate-level phosphorylation and oxidative phosphorylation. (2 marks)
6. Differentiate between Chemoheterotrophs and photoheterotrophs. (2 marks)
7. What is microbial fermentation? Write five end-products of fermentation. (2 marks)
8. Write short notes on Koch's postulates. (2 marks)
9. Describe the alternatives to glycolysis that many microbes use to oxidize glucose. (2 marks)
10. Describe the importance of microbes in our life. (3 marks)

Name:.....Roll No:

11. Draw the path of light from the source to the specimen and reaching your eye when using a phase-contrast microscope. (3 marks)
12. Describe various methods of classification and identification of bacteria. (5 marks)
13. Write the name of five scientists and their contributions to the microbiology field. (5 marks)



.....X.....The End.....X.....