Ref. No. Ex/MSBT 431/2022

M. Sc. (Biotechnology) Examination, 2022

(2nd Year, 2nd Smester)

Subject : Selected Tropics on Biotechnology

Paper : MSBT 431

Time : Two hours Full Marks : 40

Use two separate answer scripts, one for Group A & B and another for Group C & D.

Group A

Answer any *two* questions

1. What is scientific research? List various elements of organized research. 1+4=5

2. What is research proposal? What do you mean by 'Problem Statement'? 1+4=5

3. What is the goal of the 'literature review" section of your project proposal? Define the term "Funnel Point" and explain how this helps the evaluator(s) to uncover the crucial frontier areas of the research topic? 3+2=5

4. What is Plagiarism? How is it relevant to the preparation of a strong research proposal? Why timeline is important in drafting a good research proposal? 1+2+2 = 5

5. Write a title and two to three sample specific aims of your hypothetical research proposal with a brief description (in 2-3 lines) of each specific aim. 5

Group B

Answer any two questions: 2X5

6. What makes quantum dots change colors? Why quantum dots are called artificial atoms? What is the use of quantum dots in biomedicine? (2+2+1)
7. Describe the **process of vacuum sputtering** for Nanoparticle synthesis? 5
8. Define **Surface plasmon resonance (SPR). How this can be used as biosensor? (3+2)**
9. What is the advantage of green synthesis of metal nanoparticles?How Nanoparticles can be used for targeted drug delivery system. (2+3)
10. What are the advantage of using nano-vaccine over conventional vaccines? 5

Group C

Answer any two

11. What are the criteria for a patentable invention ? Explain with examples
12. What are the essential elements of a patent drafting ?
13. Write short notes on: (a)the benefit of Hatch-Waxman Law,
    (b) Bolar Excemption, (c) Compulsoty Licensing

[Turn over

14. What are the various types of Companies, can be formed under the purview of Ministry of Commerce , Govt of India ? As a beginner, what option will you choose here and why ?
15. Provide 3 examples for which Bioethics issues which need to be resolved as you can think
16. Define various BSL and precautions (equipment-way and others) are to be taken while handling

Group D
Answer any five

17. Vortexing in stirred tank reactors can be prevented by

a. installing baffles in the reactor

b. shifting the impeller to an off-center position

c. Both (a) and (b)

d. using axial flow impellers

18. Turbine impeller consists of flat impeller blades with

a. a vertical pitch welded directly to the shaft

b. a angled pitch welded directly to the shaft

c. a vertical pitch welded to a horizontal disk

d. a angled pitch welded to a horizontal disk

19. **During the exponential phase the maximum specific growth rate equals specific growth rate as**

a. concentration of the growth limiting substrate is much less than the monod constant

b. concentration of growth limiting substrate is much greater than the monod constant

c. specific growth rate increases exponentially

d. concentration of the growth limiting substrate is equal to the monod constant

20. Wash out in steady state fermentation occurs when

a. dilution rate is less than maximum specific growth rate

b. dilution rate is higher than the maximum specific growth rate

c. cell concentration reaches the maximum

d. specific growth rate is maximum

21. In batch culture, protogon is produced from peptone during the stationary phase with a yield of 0.4 protogon mg per g of peptone. If it is to be produced in a chemostat at a dilution rate of 0.5 h-1 from a medium containing 10 g.l-1 of peptone, then the rate of protogon synthesis would be

a. 0 g.l-1h-1
b. 0.5 g.l-1h-1
c. 1 g.l-1h-1
d. 2 g.l-1h-1

22. In a continuous reactor, the medium contains 40 g.l-1 of maltose and the medium flow rate is 10 litres per hour and the effluent contains 20 g.$l^{-1}$of lactate. What is the productivity of lactate production from this reactor?

a. 50 g maltose.l-1
b. 50 g lactate.l-1
c. 200 g maltose.l-1
d. 200 g lactate.l-1

23. The growth of an organism on glucose is described by the following Monod model parameters: μm = 0.5 h-1 and Ks =0.1 g.l-1, if the concentration of glucose in the feed is 10 g.l-1 and the dilution rate is set to 0.4 h-1, then the steady state concentration of glucose in the effluent will be

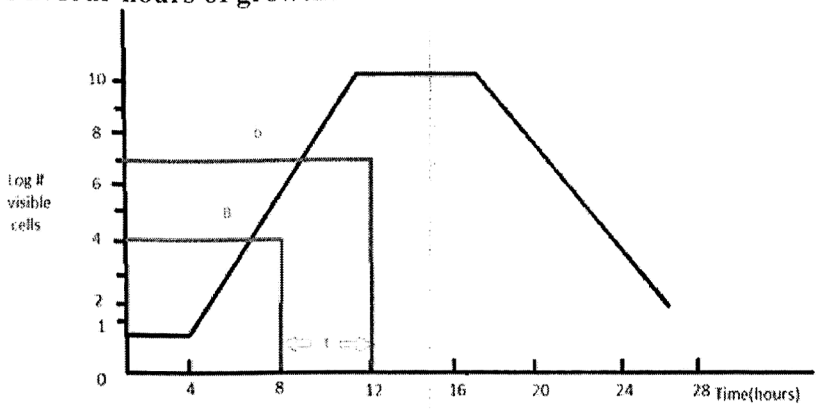
a. 0 g.l^{-1}
b. 0.5 g.l^{-1}
c. 1.0 g.l^{-1}
d. 10 g.l^{-1}

24. Two continuous bioreactors containing the same organisms, fed with the same feed at the same dilution rate were compared. Reactor 1 started with an initial concentration of glucose of 10 g.l-1, while reactor 2 contained 0.1 g.l-1 of glucose at the start of the process then at steady state

a. the concentration of glucose in reactor 1 would be greater than that in reactor 2
b. the concentration of glucose in reactor 1 would be equal to reactor 2
c. the concentration of glucose in reactor 1 would always be zero.
d. the concentration of glucose in reactor 1 would be less than that in reactor 2

[Turn over

25. What is the generation time of a bacterial population that increases from 10,000 cells to 10,000,000 cells in four hours of growth?



a. 24 minutes
b. 30 minutes
c. 34 minutes
d. 60 minutes

26. Bacillus cereus divides every 30 minutes. You inoculate a culture with exactly 100 bacterial cells. After 3 hours, how many bacteria are present and what is the generation number and time?

a) (24,000), (3 generations), (30 minutes per generation)
b) (64,000), (6 generations), (30 minutes per generation)
c) (24,000), (6 generations), (60 minutes per generation)
d) (64,000), (3 generations), (60 minutes per generation)