M.Sc. BOTANY
FOURTH SEMESTER
MICROBIOLOGY
MSB-403 E

(Use separate answer scripts for Objective & Descriptive)

Duration : 3 hrs. **Full Marks : 70**

[PART-A : Objective]

Time : 20 min. Marks : 20

Choose the correct answer from the following: 1x20=20

1. The *Candia* species require fermentation requirement lined with plastic because they are extremely sensitive to:
   a. Traces of cobalt
   b. Traces of nickel
   c. Traces of iron
   d. None of these

2. Which of the following amino acid is to be produced commercially?
   a. L-glutamic acid
   b. L-lysine
   c. L-cystine
   d. L-methionine

3. Zymase is obtained from:
   a. *Saccharomyces ludwigi*
   b. *Saccharomyces cerevisiae*
   c. *Saccharomyces boulardii*
   d. *Saccharomyces carlsbergensis*

4. The first penicillin isolated by Alexander Fleming penicillin F is called:
   a. 2-pentenyl penicillin
   b. n-heptyl penicillin
   c. Phenoxymethyl penicillin
   d. Benzyl penicillin

5. Sake is a Japanese origin rice beer with alcohol content varying from:
   a. 3 -10%
   b. 4 -17%
   c. 2 -5%
   d. 4 -20%

6. A double spiral heat-exchanger is a:
   a. Direct heat exchanger
   b. Indirect heat exchanger
   c. A temperature control device
   d. Thermostat

7. The importance of Yeast extract in the Industrial fermenter is:
   a. Acts as vitamin and micronutrient source
   b. Acts as nitrogen source
   c. Acts as carbon source
   d. Acts as carbon and nitrogen source

8. A fed-batch process is a:
   a. Closed system
   b. Continuous system
   c. Intermittently fed system
   d. Biphasic system

9. Soy meal, peptone and tryptone are used as the source of:
   a. Carbon source
   b. Carbon and nitrogen source
   c. Nitrogen source
   d. Mineral source

10. An air-lift fermenter uses:
    a. An impeller for mixing
    b. Air bubbles for mixing the content
    c. Differential density for mixing purpose
    d. A sprarger for mixing the content

11. Molasses and cornsteep liquor are usually used as:
    a. Carbon source for large scale industrial fermentation process.
    b. Carbon source for small scale industrial fermentation process.
    c. Mineral source for large scale industrial fermentation process.
    d. Mineral source for small scale industrial fermentation process.

12. Batch sterilization cycle time consists of:
    a. Two phases
    b. Three phases
    c. Four phases
    d. Five phases

13. A bioreactor to which fresh medium is continuously added, while culture liquid containing leftover nutrients metabolic end products and microorganisms are continuously removed at the same rate is called:
    a. Cryostat
    b. Chemostat
    c. Fed-batch fermenter
    d. Continuous fermenter

14. Which of the following is used as a bio-plastic?
    a. Polystyrene
    b. Polypropylene
    c. Polyhydroxybuterate
    d. Dextrene

15. Yeast cells are good source of:
    a. Vitamin A and B
    b. Vitamin A and D
    c. Vitamin B and D
    d. All of these

16. De novo synthesis of enzyme, promoted by the substrate on which acts is characterized by the term
    a. Induction
    b. Activation
    c. Gratuity
    d. Derepression

17. Rhizore mediation works through:
    a. Plant and microbes interaction in root zone.
    b. Allowing microbial absorption and toxic matter in root cells.
    c. Allowing all living cells to accumulate in the root zone.
    d. Introduction of viable cells in the root zone.

18. Wood sugar is:
    a. Glucose
    b. Manose
    c. Xylose
    d. Arbinose

19. "The design of light source is critical in the performance of a type of bioreactor". Which of the following is correct?
    a. Membrane bioreactor
    b. Air Lift bioreactor
    c. Photo bioreactor
    d. Bubble column bioreactor

20. Organic natural carrier for immobilized enzyme:
    a. Silica
    b. Porous glass
    c. DEAE-cellulose
    d. Acrylic polymers

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(PART-B : Descriptive)

Time : 2 hrs. 40 min. **Marks : 50**

[Answer question no.1 & any four (4) from the rest]

1. Describe different types of fermentation processes carried out in industry. 10

2. What is the difference between beer and wine? Write in brief the process of beer production. 5+5=10

3. What is solid state fermentation? Write in brief about solid state fermentation along with the applications in industries. 4+6=10

4. Describe in brief about different type of bioreactors. Write the advantages and disadvantages of each type of bioreactors. 6+4=10

5. a. Write in brief the production of microbial enzymes. 5+5=10
   b. Write the applications of different microbial enzymes.

6. Write in brief the production methods of PHB and mention its possible applications. 6+4=10

7. Write notes on: 5+5=10
   a. Rhizoremediation.
   b. Mycorrhizoremediation.

8. What are the scopes of petroleum microbiology? Name some hydrocarbon degrading microorganisms. Write in brief the methods of enhanced crude oil recovery. 3+3+4=10

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