

Write the following information in the first page of Answer Script before starting answer

**ODD SEMESTER EXAMINATION: 2020-21**

Exam ID Number \_\_\_\_\_

Course \_\_\_\_\_ Semester \_\_\_\_\_

Paper Code \_\_\_\_\_ Paper Title \_\_\_\_\_

Type of Exam: \_\_\_\_\_ (Regular/Back/Improvement)

**Important Instruction for students:**

1. Student should write objective and descriptive answer on plain white paper.
2. Give page number in each page starting from 1<sup>st</sup> page.
3. After completion of examination, Scan all pages, convert into a single PDF, rename the file with Class Roll No. (2019MBA15) and upload to the Google classroom as attachment.
4. Exam timing from 10am – 1pm (for morning shift).
5. Question Paper will be uploaded before 10 mins from the schedule time.
6. Additional 20 mins time will be given for scanning and uploading the single PDF file.
7. Student will be marked as ABSENT if failed to upload the PDF answer script due to any reason.

**B.SC. BIOTECHNOLOGY  
FIFTH SEMESTER  
INDUSTRIAL FERMENTATION  
BBT - 501**

Duration : 3 hrs.

Full Marks : 70

**PART-A: Objective**

Time : 20 min.

Marks : 20

**Choose the correct answer from the following:**

**1 × 20 = 20**

1. Second generation biofuels are made up of
  - a. Food crops
  - b. Lignocellulosic biomass
  - c. Algae
  - d. Metabolically engineered microorganisms
2. Main fermentation product of *Clostridium propionicum* is
  - a. Itachonic acid
  - b. Butanol
  - c. Acetyl coA
  - d. Propionate
3. An example of impeller is \_\_\_\_\_
  - a. Rustom disc
  - b. Sparger
  - c. Photographic plate
  - d. Tube
4. A carbon/nitrogen ratio of around \_\_\_\_\_ is considered to be favourable for optimal polysaccharide synthesis.
  - a. 5:1
  - b. 7:1
  - c. 10:1
  - d. 1:10
5. pyruvate → α-acetolactate → acetoin and/or diacetyl → \_\_\_\_\_
  - a. Acetic acid
  - b. 2,3-BD
  - c. Propionic acid
  - d. Butyric acid
6. Aspect ratio of bubble column bioreactor is
  - a. 4-6
  - b. 9-12
  - c. 1-3
  - d. 15-20
7. Oxosynthesis is a process of
  - a. Production of aldehydes from alkenes
  - b. Production of aldehydes from ketones
  - c. Production of aldehydes from alkanes
  - d. Production of aldehydes from alcohols
8. In which phase of biogas production, complex organic material is converted to low molecular weight soluble products?
  - a. Methanogenic phase
  - b. Hydrolytic phase
  - c. Acetogenic phase
  - d. Acidifying phase
9. Formulation of fermentation media belongs to
  - a. Downstream process
  - b. Upstream process
  - c. Both a) and b)
  - d. None of the above

10. Product recovery belongs to \_\_\_\_\_
- Upstream process
  - Downstream process
  - Both a) and b)
  - Only a
11. In PFOR pathway moles of  $H_2$  released/ mole of glucose is/are
- 1
  - 2
  - 3
  - 4
12. The continuous cultures are not widely used in industry because
- They are not suited for the production of secondary metabolites
  - Contamination or mutation can have a disastrous effect on the operation
  - The government will not approve the licensing of pharmaceutical products in continuous culture
  - All of the above
13. Bacteria secrete or produce secondary metabolites in \_\_\_\_ of growth curve
- Lag phase
  - Log phase
  - Stationary phase
  - Death phase
14. Proteinases are
- Extracellular
  - Endocellular
  - Both a) and b)
  - None of the above
15. In which phase, the growth is maximum?
- log phase
  - exponential phase
  - lag phase
  - both (a) and (b)
16. Substrate analogue works during
- competitive inhibition
  - non competitive inhibition
  - uncompetitive inhibition
  - all of the above
17. If glucose is given along with lactose in a broth, what type of growth is seen?
- There will be no change in growth
  - a sigmoid growth curve
  - a diauxic growth curve
  - only (a) is true
18. What is the relation of  $K_m$  and  $V_{max}$  in non competitive inhibition?
- $K_m$  remains unchanged while  $V_{max}$  increases
  - $K_m$  remain unchanged while  $V_{max}$  decreases
  - both  $K_m$  and  $V_{max}$  increases
  - none of the above
19. In chemostat, growth is calculated using
- Turbidity of the medium
  - colour of the media
  - amount of growth limiting factor
  - amount of basal components
20. At a low temperature as low as 10 degrees C, what will happen to enzyme activity?
- Activity decreases due to denaturation
  - activity decreases due to inactive enzymes
  - activity increases 10 times than usual
  - all are true

**( PART-B : Descriptive )**

Time : 2 hrs. 40 min.

Marks : 50

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

1. Draw a neat labelled diagram of a bioreactor and write a note on it. 2+3+5  
=10  
Describe briefly about the tower bioreactor with a neat labelled diagram.
2. Write short note on the following: 2×5=10
  - a. Upstream processing
  - b. Solid liquid separation
3. Write a note on substrates used in Biogas production. Describe production process with suitable diagram. 3+7=10
4. Discuss the industrial production of ethanol and its applications. 10
5. Write a note on 5+5=10
  - a. Steroid fermentation
  - b. Enzyme and cell immobilization techniques in industrial processing
6. Define suspension culture. What are the precautions taken for suspension culture? Derive the mathematical derivation of continuous culture 2+2+6  
=10
7. Why does line weaver burk plot have an advantage over the Michaelis-Menten curve? Explain how enzyme-substrate complex inhibits enzyme activity. What happens to enzyme activity when an activator is added along with substrate? Explain. 2+5+3  
=10
8. Explain why a bell shaped curve is obtained with the change in temperature and pH. Explain batch culture and the kind of growth curve obtained during such culture. 5+5=10

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