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Invigilator's Signature :	•••••

CS/B.Tech(BT)/SEM-4/BT-402/2011 2011

INDUSTRIAL MICROBIOLOGY & ENZYME TECHNOLOGY

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

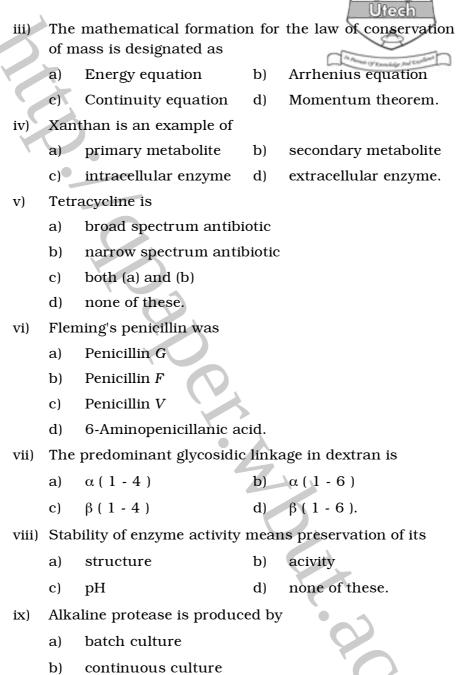
GROUP – A (Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following :

 $10 \times 1 = 10$

- i) Which of the following may cause changes in the number of chromosome?
 - a) Chromosome mutation
 - b) Genome mutation
 - c) Point mutation
 - d) Transitions.
- ii) Bingham plastic fluids are described by
 - a) $\tau g_c = \mu \left(\frac{du}{dy} \right)$
 - b) $\tau g_c = \tau_o g_c + k \left(\frac{du}{dy}\right)$
 - c) $\tau g_c = k \left(\frac{\mathrm{d}u}{\mathrm{d}y} \right)^n$
 - d) none of these.

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c)

d)

solid state fermentation

fed-batch culture.



- x) Biopol is composed of
 - a) Polyhydroxyoctanoate
 - b) Polyhydroxybutyrate
 - c) Polyhydroxyvalerate
 - d) Poly (3-hydroxybutyrate-co-3-hydroxyvalerate)
- xi) Lyophilization is the storage of commercial strain through
 - a) sporulation
 - b) freeze-drying
 - c) mixing with soil
 - d) boiling and condensation.
- xii) Riboflavin is commercially synthesized by
 - a) ashbya gossypii
- b) Pseudomonas ovalis
- c) Bacillus subtilis
- d) Klebsiella sp.

GROUP - B

(Short Answer Type Questions)

Answer any three of the following.

 $3 \times 5 = 15$

- 2. What do you mean by submerged and solid state fermentation? Briefly state the merits and demerits of solid state fermentation.
- 3. Derive the equation of continuity.
- 4. What do you mean by enzyme stability? What are the different methods available to engineer a protein? What are the different invitro methods available to attempt make a more stable enzyme. 1 + 1 + 3
- 5. E.coli have a maximum respiration rate, $q_{O_2 max}$, of about 240 mg O $_2$ /gX.h. It is desired to achieve a cell mass of 20 g/l. The K_L a is 120/h in an 8001 reactor. A gas stream enriched in oxygen is used which gives a value of $C^* = 28$ mg/l. If oxygen becomes limiting and q_{O_2} follows Monod kinetics with respect to C_L with a saturation constant value of 0.2 mg/l, where C_L is the dissolved oxygen concentration in the fermentor. What is the C_L when cell mass is 20 g/l?
- 6. Describe Navier-Strokes equation and its application.



(Long Answer Type Questions)

Answer any three of the following.



- 7. What is $K_L a$? How many types of $K_L a$ measurement methods are there? Describe the dynamic method for the measurement of $K_L a$. 2+3+10
- 8. What are base analogs? Describe a method by which induced mutation can be achieved for the improvement of microbial strains. 4 + 11
- 9. Define immobilization of enzymes. How many types of carriers are being used to immobilize enzyme? Give some examples of enzyme application in medical and industrial field. What are the different merits of immobilized enzyme over soluble enzyme for use in bioprocess? 2 + 4 + 4 + 5
- 10. Write briefly about any *three* of the following : $3 \times 5 = 15$
 - a) Heterogeneous versus diffusion chemical reaction
 - b) Application of heat transfer to bioreactor system
 - c) Half-life method
 - d) Transition versus transversion.
- 11. What are β lactam antibiotics? Write briefly the process of industrial production of tetracycline with particular reference about microbial strain, inoculum preparation, production medium, fermentation parametes, fermentation process, recovery and yield. $1+1+2\frac{1}{2}+2\frac{1}{2}+2+3+2+1$

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