AQ – 2747

First Semester M. Tech. (Chem. Engg) (C.B.S.) Examination

ADVANCE BIOCHEMICAL ENGINEERING

1 CE 2

P. Pages : 2

Time : Three Hours] [Max. Marks : 80

Note : (1) All questions carry marks as indicated.
(2) Answer **Six** questions.
(3) Due credit will be given to neatness and adequate dimensions.
(4) Assume suitable data wherever necessary.
(5) Diagrams and Chemical equations should be given wherever necessary.
(6) Illustrate your answer wherever necessary with the help of neat sketches.
(7) Use pen of Blue/Black ink/refill only for writing the answer book.

1. Derive the expression.

$$Ss = \frac{Ks\ (D)}{\mu max\ -(D)}$$

Where Ss = Residual limiting substrace concentration.

Ks = Substrate utilization constant.

D = Dilution rate

μmax = Maximum growth rate.

Explain the significance of D. 14

2. Explain in detail the growth associate and own growth associated product formation. with suitable examples. 13

3. A fermentation medium contains an initial spores concentration of 8.5×10^{10}. The medium is sterilized thermally at 120^0C and the spore density was noted with the progress of time. The data is as follows.

Time (min)	0	5	10	15	20	30
Spore density (m^{-3})	8.5×10^{10}	4.23×10^9	6.2×10^7	1.8×10^6	4.5×10^4	32.5

(i) Find the thermal death kinetic rate constant in S^{-1}

(ii) With the above data calculate the inactivation factor at 40 min. 14

4. (a) Describe continuous sterilisation in detail. 7

(b) Explain the methods for evaluating Del factor in sterilization. 6

5. Discuss the factors affecting oxygen transfer rate in fermentor in detail. 13

6. Explain the methods of measurement of K_La in detail. 13

7. (a) What are the applications of enzymes in food and beverage industry ? 7

(b) Describe the Fischer-lock-and Key hypothesis for enzyme specificity. 6

8. Describe the manufacturing process to obtain ethanol from a suitable raw material via fermentation route. 13

9. Explain the manufacturing process of and purification of penicillin G with the help of neat flow diagram. 13

10. Explain in detail the scale up of Bioreactor on the basis of

(i) Constank K_La

(ii) Contant (p/v) ratio. 13