PG/IIIS/MCB-303/19

M.Sc 3rd Semester Examination, 2019

MICROBIOLOGY

PAPER – MCB-303

Full Marks : 40

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

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

Illustrate the answers wherever necessary

GROUP – A

[*Marks* : 20]

1. Answer any *two* questions : 2×2

   (*a*) Define Viscosity. Mention its utility in bioprocess. $1 + 1$

(*b*) Define stedy-state kinetics in a continuous culture. 2

(*c*) Define Reynolds number. 2

(*d*) What is Kolmogorov scale ? Mention its use. 1 + 1

2. Answer any *two* questions : 4 × 2

(*a*) Classify the types of impellers used in mechanically agitated bioreactor. 4

(*b*) Define mass transfer in a bioprocess. What are the limitations in oxygen-transfer within a bioreactor performing specific fermentation. 2 + 2

(*c*) Mention the advantages and disadvantages of down-stream processing. 2 + 2

(*d*) Elucidate the physical factors in fluid-mixing. 4

3. Answer any *one* questions : 8 × 1

(*a*) (*i*) A fluid flowing with a speed of 768m/sec transfers the momentum to a horizontal

metal plate having a dimension of 10cm × 4cm × 1cm with specific gravity of 1.27. Calculate the momentum transferred to the plate and the distance travelled by the plate under this impact with the fluid.

(*ii*) Describe the classification of fluids based on different parameters in bioprocess. 4 + 4

(*b*) (*i*) Differentiate between an airlift fermenter with a bubble column fermenter.

(*ii*) A strain of *Acetobacter acetic* is cultured in $15m^3$ stirred tank reactor for acetic acid production. Under current operating conditions $K_L a$ is $0{\cdot}17s^{-1}$ oxygen solubility in broth is 8×10^{-3} kg/m^3. The specific rate of O_2 uplake is $12{\cdot}5$ m mol g^{-1} hr^{-1}, What is the maximum possible cell concentration. 5 + 3

GROUP– B

[*Marks* : 20]

4. Answer any *two* questions : 2 × 2

(*a*) What are the major causes of food spoilage ? 2

(*b*) What are short chain fatty acids (SCFA's) and Why they are so important ? 1 + 1

(*c*) Distinguish between homo and hetero. lactic fermentation. 2

(*d*) Why fermented foods are generally regarded as functional food ? 2

5. Answer any *two* questions : 4 × 2

(*a*) Briefly describe the food borne diseases caused by the following microbes : 2 + 2
(*i*) *E. Coli* (*ii*) *Shigella Sp.*

(*b*) Schematically describe the production of Sauerkraut. 4

(*c*) Define probiotics. Why they are so called health supporting ingredients. 1 + 3

(*d*) What are different methods of pasteurization and state their applications with example. 2 + 2

6. Answer any *one* question : 8 × 1

(*a*) Describe any four non-thermal methods of food preservation. 4 × 2

(*b*) How both intrinsic and extrinsic factors affected food spoilage. 4 + 4