PG/IIIS/MCB-303/18

M.Sc. 3rd Semester Examination, 2018

MICROBIOLOGY

PAPER—MCB-303

Full Marks : 40

Time : 2 hours

Answer any **two** questions from each Group

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]

Answer any **two** questions

1. (*a*) Define bioprocess. How does the formation of eddies help in the bioprocess ? 1 + 1

(*b*) Classify the types of impeller used in mechanically agitated bioreactors. 3

(*c*) When an aerobic fermenter of capacity 650 litres is supplied with a flow of 340 g/min of O_2, out of which 2·5 % is utilized by growing *Ps. putida* and another 0.5% is used in redox reactions. Calculate the mass transfer to the fermenter headspace, assuming 20 % headspace sp. gravity of air = 0.63, 1 litre = 988g. Also calculate the excess pressure on the outlet if the area of cross-section of the vessel is 225 cm^2. 3

(*d*) What do you mean by Newton's law of viscosity ? 2

2. (*a*) What do you mean by steady-state kinetics in continuous culture ? 2

(*b*) Explain the operational significance of steady state kinetics in modern bioprocess technology. 3

(*c*) A fluid flowing with a speed of 844m/sec transfers the momentum to a horizontal metal plate having a dimension 8 cm × 4 cm × 1 cm with sp. gravity 1·37. Calculate the momentum transferred to the plate and the distance travelled by the plate under this impact with the fluid. 3

(*d*) $C_6H_{12}O_6 + NH_3 = C_5H_9NO_4$ (*L*-glutamate) $+ CO_2 + 3H_2O$

What ml of mass of O_2 is required to produce 15g of *L*-glutamate under optimum conditions. 2

3. Write short notes on any *four* : $2\frac{1}{2} \times 4$

(*i*) Reynold's Number

(*ii*) Down stream processing

(*iii*) Efficiency of Fluid mixing

(*iv*) Physical factors in fluid mixing

(*v*) Kolmogorov scale.

(*vi*) Scale-up of bio-process.

GROUP–B

[*Marks* : 20]

Answer any **two** questions

1. (*a*) What is FDA ? Explain its role in the maintenance of food standard. 1 + 2

   (*b*) Define *D*-value and *Z*-value. 2

   (*c*) Briefly describe the food borne diseases caused by the following microorganisms :

   (*i*) *Clostridium botulinum*

   (*ii*) *Listeria monocytogens.* 5

2. (*a*) What are the methods used for food preservation. State the advantages of high pressure technology in food preservation ? 1 + 2

   (*b*) What is starter culture ? How do you select a good starter culture ? 1 + 3

   (*c*) What is fermented food ? Give a flow sheet for the preparation of cheese. 1 + 2

3. Write notes on any *four* of the following : $2\frac{1}{2} \times 4$

(*i*) Criteria of a good preservative

(*ii*) Bacteriocin

(*iii*) HACCP

(*iv*) Spoilage of Fruits and Vegitables

(*v*) GM Foods

(*vi*) Probiotics.