M.Sc. Examination 2022
Semester III
Biotechnology
Core Course - XIII
(Bioprocess Engineering and Technology, Bioentrepreneurship)

Time: 3 hours   **Full Marks: 40**

Questions are of values as indicated in the margin

Group A - Bioprocess Engineering and Technology

Answer any *three* questions   10x3 = 30

1. (a) Prove that a tubular plug flow reactor is always smaller than the stirred tank reactor for a given conversion when kinetics are in positive order.
   (b) You were asked to produce a cellobiose dehydrogenase enzyme using *T. clypeatus*. You have a bubble column reactor, stirred tank reactor and fluidized bed reactor. Suggest your preferences and rejection reasons with justifications.

                                                                    5+5=10

2. (a) Explain the effect of permeability on glutamic acid production.
   (b) Draw a schematic diagram for mass culturing of *Rhizobia*.

                                                                    5+5=10

3. (a) Derive the design equation for a plug flow and stirred tank reactor.
   (b) Explain the surface culture method of citric acid production.

                                                                    5+5=10

4. (a) Write short notes on
   (i) Dirac-delta function,
   (ii) Airlift bioreactor.
   (b) Estimate the theoretical growth and product yield coefficient for ethanol fermentation by *S. cerevisiae* as described by the following equation
$$C_6H_{12}O_6 \longrightarrow 2C_2H_5OH + 2CO_2$$

                                                                    (2.5+2.5)+5=10

Group B - Bioentrepreneurship

Answer any *one* questions   10 x 1 = 10

5. (a) what are the qualities necessary to be a successful entrepreneur?
   (b) What is business opportunity? What are its different elements?

                                                                    3+(3+4) =10

6. What are the different sources of funding available for an entrepreneur?

                                                                    10