(3 Hours) **(100 Marks)**

Instructions to the candidates:

i) **All** questions are **compulsory.** Choice is **internal**
ii) Figures to **the right** indicate **full marks**.
iii) Draw structures and diagrams wherever necessary.
iv) Draw flowcharts /diagrams wherever necessary.

Q.1A) State true or false: **(04)**

i) All viruses contain DNA.
ii) Presence of *Mycobacterium* indicates faecal contamination.
iii) Large number of actinomycetes are present in dry warm soil.
iv) *Staphylococcus* produces mycotoxin.

Q.1B) Write short notes on: (Any three) **(09)**

i) Asymbiotic nitrogen fixation.
ii) Classification of viruses based on hosts.
iii) Diagrammatic representation of lysogenic cycle.
iv) Yeast and its uses.
v) Probiotics.
vi) Bacterial infection.

Q.1C) Answer the following:(Any two) **(12)**

i) Write detailed account of airborne pathogens.
ii) Discuss water and food borne diseases and their control.
iii) Write a note on *Shigella* and Morbillivirus
iv) Beneficial microorganisms of human gut.

Q2. A) State True or False: **(04)**

i) Cell culture of blood cells is anchorage independent.
ii) Septic conditions are necessary to eliminate contaminations.
iii) Culture systems are dependent on environmental factors.
iv) Secondary metabolites participate in metabolism of plants.

Q2. B) Answer the following: (**Any three**) **(09)**

i) What is the composition of nutrient agar? Mention use of each component.
ii) What are vaccines? Discuss in detail different types of vaccines used these days.
iii) In brief, explain callus regeneration and factors affecting it.
iv) Schematically represent the technique of micropropagation.
v) Briefly explain the concept of totipotency.
vi) What is HGPRT? Briefly explain its significance in animal tissue culture.

Q2. C) Answer the following: (A**ny two**) **(12)**

i) Which technique is used to produce 'pomato', a hybrid of tomato and potato? Explain the same.
ii) Elaborate on the various components of growth media used in cell culture.
iii) Discuss the different types of stem cells. Add a note on application of stem cell culture.
iv) Discuss technique and applications of animal tissue culture.

Q.3A) State true or false: **(04)**

i) Continuous fermentation is monitored by use of turbidometric principle.
ii) DEAE sephadex is used as inert support for adsorption.
iii) A biosensor has four distinct components.
iv) Symba process was developed in USA for single cell protein production.

Q.3B) Write short notes on: (Any three) **(09)**

i) Bubble cap fermenter
ii) Optical biosensor
iii) Stabilization of enzymes by solvent and substrate
iv) Fungal proteins
v) Applications of biosensors in pollution control
vi) Role of baffle, sparger and impellor in a fermenter

Q.3C) Answer the following: (Any two) **(12)**

i) With the help of a suitable diagram discuss a typical fermenter with its features.
ii) Describe the single cell protein production from high energy sources and wastes. Add a note on its applications.
iii) Describe covalent binding and entrapment as immobilization techniques.
iv)With the help of a flowsheet give detailed account of penicillin production.

Q.4 (a) Define and explain: (Any five) **(10)**

(i) Protoplast culture. (ii) Dedifferentiation (iii) Whole embryo culture (iv) Proteolysis
(v) Pathogen (vi) Icosahedral symmetry (vii) Countercurrent extraction

Q.4 (b) Write elaborate notes on: (Any three) **(15)**

i) Secondary metabolites
ii) Hybridoma
iii) Continuous stirred tank fermenter
iv) Immunobiosensors
v) Typical virus with labelled diagram
vi) Wine production

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