N.B. All questions are compulsory
Numbers to the right indicate marks
Draw neat labeled diagram wherever necessary
Duration: 2.5 hours **Total marks: 60**

Q.1 Answer **any four** of the following **16**

a. Explain in brief the Crowded plate technique for screening of antibiotic producers.

b. Differentiate between batch and continuous fermentation.

c. Justify: Auxotrophic mutants of *C. glutamicum* have been used for the production of lysine.

d. Write a note on quality control of preserved culture stocks.

e. Schematically explain the use of the penicillin enrichment technique for the isolation of auxotrophic mutants.

f. Write a note on Submerged fermentation.

g. Give a detailed account of cryopreservation as a method of preserving cultures.

h. Explain the improvement of strains by modifying properties other than yield of products.

Q.2 Answer **any four** of the following **16**

a. Represent using a flow diagram the ' production of penicillin'.

b. Enlist the properties of an ideal fermenter.

c. Justify: Various substances can be used as economic alternatives to suffice carbon requirements in fermentation medium.

d. Enlist the advantages of using separate mash cookers for batch sterilization of medium.

e. Elaborate on chelating agents and buffering agents added to a fermentation medium

f. Give a detailed account of the continuous sterilization process.

g. Write a note on product recovery of ethanol.

h. Write a note on types of fermenters.

Q.3 Answer **any four** of the following 16

a. Elaborate on the filtration process also add a note on filter aids.

b. Give a detailed account of Ion exchange chromatography.

c. Write a note on chemical methods used for cell disruption.

d. Discuss in detail any two methods for drying of fermentation products.

e. With the help of a neat and labeled diagram, explain basket centrifuge.

f. Write a note on foam separation for removal of microbial cells and solid matter.

g. What are the different criteria affecting the choice of recovery process?

h. Elaborate on Continuous filtration.

Q.4 Answer **any six** of the following 12

a. Give the full forms of - DMSO, OECD.

b. What is cumulative feedback control?

c. State any two key criteria of OECD guidelines for validation of preserved stocks.

d. Name any two miniaturized screening techniques for improved secondary metabolite producers.

e. Name any two commonly used substrates for ethanol production.

f. Name any two types of spargers.

g. What are baffles? State its significance.

h. Give any two examples of inhibitors used in a fermentation medium.

i. State the principle of Reverse phase chromatography.

j. Name two flocculating agents.

k. Name two agents used for precipitation of proteins.

l. Explain freeze thawing method for cell disruption.

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