Q.P. Code :20790

[Time: Three Hours] **[Marks:100]**

Please check whether you have got the right question paper.

N.B:
1. All questions are compulsory. Choice is internal.
2. Figures to the right indicate full marks.
3. All questions carry equal marks.
4. Draw flowcharts / diagrams wherever necessary.

Q.1 A) Match the column: 04

Column 'A'	**Column 'B'**
a) *Azotobacter*	i) Retention of proliferative capacity
b) Stem cells	ii) DNA as genetic material
c) Retrovirus	iii) Symbiotic nitrogen fixing
d) *Rhizobium*	iv) RNA as genetic material
	v) Asymbiotic nitrogen fixing
	vi) Protoplast isolation

B) Answer the following: **(any three)** 09
i) Discuss the types of plant tissue culture
ii) Write about natural growth media and its limitations
iii) What are the types of viruses based on genomic variations? Give two examples of animal viruses.
iv) Giving names of the microorganisms involved give reactions of the nitrogen cycle
v) Differentiate between sterilization and disinfection giving suitable examples of each.
vi) Write in brief about applications of animal tissue culture.

C) Answer the following: **(any two)** 12
i) Elaborate on stem cell culture stating its advantages and applications.
ii) Write an informative note on vaccines
iii) Give detailed account of advantages and limitations of secondary metabolites
iv) Discuss constituents of growth media used for plant tissue culture

Q.2 A) Match the column : 04

Column A	**Column B**
a) Ultrasonication	i) Microfluidizer
b) Lyophilizer	ii) Physical method of cell disruption
c) Gel filtration	iii) Separation of biomass
d) Impingement	iv) Chemical method of cell disruption
	v) Drying
	vi) Precipitation

B) Answer the following: **(any three)** 09
i) Enlisting the methods used for primary screening, discuss any one in detail.
ii) Which agents are used for precipitation of fermentation product?
iii) Write in brief on fluidized bed fermenter.
iv) Mentioning the products obtained discuss about cellulosic materials used for fermentation.

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v) State true or false giving reason: Most of the fermentations are carried out at neutral pH.

vi) Discuss in brief methods used for solid-liquid separation of fermentation product

C) Answer the following: **(any two)** 12

i) Describe two ways of carrying out sterilization of production media .Add a note on advantages and limitations of both.

ii) Screening and selection of microorganism is the most essential step for successful fermentation. Justify. Also mention the desirable characteristics of the production strain.

iii) Write an informative note on aeration required for fermentation. Also state principle modes of injecting air into the fermentation vessel.

iv) Recovery of the pure product is an outcome of very systematic and complex process. Explain giving schematic representation of major steps in downstream processing

Q.3 A) Match the column: 04

Column A	Column B
a) Amperometric biosensor	i) Measurement of absorbance
b) Potentiometric biosensor	ii) Movement of electrons
c) Conductometric biosensor	iii) Principle of acoustics
d) Thermometric biosensor	iv) Ion selective electrodes
	v) Production of heat
	vi) Alteration in electrical conductivity

B) Answer the following: **(any three)** 09

i) Giving flowsheet diagram discuss process of cheese production.

ii) Describe adsorption used as a technique for immobilization of enzymes.

iii) Briefly describe the recovery of vitamin $B_{12.}$

iv) Elaborate on the therapeutic applications of immobilized enzymes and cells.

v) Write a note on bacterial proteins.

vi) Describe the process of single cell protein production from high energy compounds.

C) Answer the following: **(any two)** 12

i) Suggest methods which can be used to stabilize and immobilize soluble enzyme.

ii) Give comparative account of piezoelectric and whole cell biosensors. Also mention their advantages and uses.

iii) With the help of flowsheet explain the production of ethanol.

iv) Use of microorganisms is a better option for single cell protein production. Explain mentioning advantage of the same.

Q.4 A) Define the following: **(any five)** 10

i) Submerged culture

ii) Transducer

iii) Algal proteins

iv) Microencapsulation

v) Acid proteases

vi) Starch hydrolysate

vii) Counter current solvent extraction

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B) Answer the following: **(any three)** 15

i) What are optical biosensors? Explain its different types.

ii) Elaborate on the physical and chemical agents used for sterilization giving suitable examples.

iii) Describe covalent binding and cross-linking techniques of immobilization of enzymes, stating various compounds and agents used for the same.

iv) Write an informative note on preparation of inoculum.

v) Give detailed account of somatic hybridization.

vi) Discuss hybridoma technology and its applications.

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