

P325

[3919-A] - 11
B.Sc. (Applied)
BIOTECHNOLOGY
M-11: Microbial Biotechnology - I
(Sem. - I)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) All questions are compulsory.**
- 2) Neat labelled diagrams must be drawn wherever necessary.**
- 3) Figures to the right indicate full marks.**

Q1) Select the correct option.

[5]

- a) Blood agar is an example of a media.
 - i) Selective.
 - ii) Differential.
 - iii) Enriched.
 - iv) Enrichment.
- b) Which of the following stain is known as cell permeable?
 - i) Crystal violet.
 - ii) Cotton blue.
 - iii) Methyl red.
 - iv) Safranin.
- c) Which one of the following is not a fermented product?
 - i) Antibiotics.
 - ii) Citric acid.
 - iii) Alcohol.
 - iv) Vaccines.
- d) Formyl methionine is a characteristic feature of ——.
 - i) True bacteria.
 - ii) Actinomycetes.
 - iii) Both.
 - iv) None.
- e) Plateau phase indicates ——.
 - i) Exponential growth of cells.
 - ii) Steady growth of cells.
 - iii) No growth of cells.
 - iv) None of the above.

P.T.O.

Q2) Attempt any five of the following: [10]

- a) Enlist biotech industries producing vaccines.
- b) Give examples of any four industrially important fungi with their uses.
- c) What is importance of enrichment media in isolation of bacteria?
- d) Define TDT and Z-value.
- e) What is synchronous culture?
- f) Give the mechanism of nitrogenase encapsulation in aerobic nitrogen fixers.
- g) Mention any two examples of indicator organisms.

Q3) Answer any three of the following: [15]

- a) Write briefly on sterility testing of an injectible.
- b) Describe thallus structure of fungi.
- c) What are steps in the formation of root nodules in leguminous plants.
- d) Comment on “Rumen-Microbial ecosystem”.
- e) Explain IMVIC test with suitable examples.



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[3919-A] - 13
B.Sc. (Applied)
BIOTECHNOLOGY
M-13: Microbial Genetics & Immunology
(Sem. - I)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat labelled diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Select the correct option. **[5]**

- a) Human blood groups is said to be an example of
 - i) Complete Dominance.
 - ii) Incomplete Dominance.
 - iii) Co dominance.
 - iv) None of these.
- b) A chromosome lost its few genes during a process of metabolism/ mutation, known as –
 - i) Duplication.
 - ii) Translocation.
 - iii) Inversion.
 - iv) Deletion.
- c) A antibody IgG is made up of
 - i) Light & heavy chains.
 - ii) Only light chains.
 - iii) Only heavy chains.
 - iv) None of these.
- d) SDS - PAGE is used in one of the following immunological technique –
 - i) Immunodiffusion.
 - ii) Immunoprecipitation.
 - iii) Immunoelectrophoresis.
 - iv) Western Blotting.
- e) β -Galactosidase enzyme can be expressed from a gene –
 - i) lac A.
 - ii) lac Y.
 - iii) lac Z.
 - iv) lac X.

P.T.O.

Q2) Attempt any five of the following:

[10]

- a) What is linkage? Mention its types.
- b) Explain in brief Multiple Allelism.
- c) Differentiate 'R'- Plasmid & 'Col'- Plasmid.
- d) What are Tn & Is? Enlist examples.
- e) Define:
 - i) Hapten.
 - ii) Vaccine.
- f) What is enploidy? Enlist types with example.
- g) Explain in brief Rocket-Immunoelectrophoresis.

Q3) Attempt any three of the following:

[15]

- a) What are chromosomal alterations? Enlist the types and explain any one with example.
- b) What is antigen? Explain the different types with examples.
- c) Give an comparative account of generalized and specialized transduction.
- d) Describe the concept of Innate immunity.
- e) State & explain law of purity of gametes.



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[3919-A] - 15
B.Sc. (Applied)
BIOTECHNOLOGY

M-15 / P-15: Fundamentals of Biological Chemistry
(Sem. - I)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Neat labelled diagrams must be drawn wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Select the correct option.

[5]

- a) A lipid having tetracycline structure is –
 - i) Hard fat.
 - ii) Wax.
 - iii) Phospholipid.
 - iv) Sterol.
- b) Lock and key hypothesis to explain action of enzymes was proposed by:
 - i) Kogl.
 - ii) Fischer.
 - iii) Miller.
 - iv) Lederberg & Tatum.
- c) FAD or FMN is a coenzyme. Which vitamin is incorporated in its structure?
 - i) Vitamin C.
 - ii) Vitamin B₁.
 - iii) Vitamin B₆.
 - iv) Vitamin B₂.
- d) Subcellular components are separated by –
 - i) Electrophoresis.
 - ii) Autoradiography.
 - iii) Chromatography.
 - iv) Differential Centrifugation.
- e) The distance between spiral turn of Z - DNA is ————
 - i) 3.4 Å°
 - ii) 45Å°
 - iii) 34Å°
 - iv) 170Å°.

P.T.O.

Q2) Attempt any five of the following:

[10]

- a) Give structure of thiamine and serine.
- b) Mention coenzymes with examples.
- c) What is ATP?
- d) Define reducing sugars.
- e) Give role of SDS in SDS-PAGE.
- f) Calculate pH of HCl if its H^+ concentration is 10^{-6} .
- g) Give biological importance of lipids.

Q3) Attempt any three of the following:

[15]

- a) Give distinguishing characters of B-and A-DNA.
- b) Describe essential and non-essential amino acids with examples.
- c) Comment on Eadie-Hofstee plot.
- d) Give concise account of HPLC.
- e) Comment on applications of electrophoresis in biochemistry.



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[3919-A] - 17

B.Sc. (Applied)

BIOTECHNOLOGY (Sem. - I)

M-17/P-16 : Biophysics and Instrumentation

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Draw neat & labelled diagrams wherever necessary.*
- 3) *Figures to the right indicate full marks.*

Q1) Select the correct option.

[5]

- a) 400-750 nm is the range of –
 - i) Vis Spectra.
 - ii) Uv Spectra.
 - iii) IR Spectra.
 - iv) None of these.
- b) The method by which molecular at of proteins can be measured is –
 - i) Chromatography.
 - ii) Electrophoresis.
 - iii) Both (i) & (ii).
 - iv) None of these.
- c) Electrons are utilized to obtain SEM image.
 - i) Elastically scattered.
 - ii) Back scattered primary.
 - iii) Back scattered secondary.
 - iv) Un scattered.
- d) Energy is required for –
 - i) Active transport.
 - ii) Diffussion.
 - iii) Fascillated transport.
 - iv) All of these.
- e) The resolving power of a light microscope is –
 - i) 0.1 micron.
 - ii) 0.2 micron.
 - iii) 0.3 micron.
 - iv) 0.4 micron.

P.T.O.

Q2) Attempt any five of the following:

[10]

- a) Explain in brief Gibb's Free Energy.
- b) Give applications and principle of refrigeration.
- c) How mitochondria & Chloroplast acts as a source of energy?
- d) Enlist the applications of spectroscopy to biomolecules.
- e) What is membrane potential?
- f) Differentiate analytical & differential p^H meter.
- g) Enlist the factors affecting on permeability of membrane.

Q3) Answer any three of the following:

[15]

- a) Describe the technique scintillation counting.
- b) Give an account of principle, working and applications of IR spectroscopy.
- c) Describe the concept of physical and biological half life. Give its formula to calculate.
- d) Explain the electrical and mechanical and conformational properties of membrane.
- e) Explain the terms—
 - i) Diffusion.
 - ii) Adsorption.
 - iii) Osmosis.
 - iv) Absorbtion.
 - v) Excitation.



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[3919-A] - 21
B.Sc. (Applied)
BIOTECHNOLOGY
M-21: Microbial Bio-Technology - II
(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat labelled diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Select the correct option.

[5]

- a) Which of the following does not affect $K_L a$ value ———.
 - i) Air flow rate.
 - ii) Degree of agitation.
 - iii) Presence of antifoam agents.
 - iv) Presence of enzymes.
- b) Precursor used for Penicillin & Production is ———.
 - i) α -Amino butyric acid.
 - ii) Benzoic acid.
 - iii) Phenyl acetic acid.
 - iv) Phenoxy acetic acid.
- c) Which of the following is not true about serum free media.
 - i) They provide simplified downstream processing.
 - ii) Costlier than serum containing media.
 - iii) Defined medium composition.
 - iv) Reduction of batch to batch variation.
- d) Which of the following factors affect L- glutamic acid production ———
 - i) Biotin.
 - ii) Membrane lipids.
 - iii) Both (i) & (ii).
 - iv) Presence of glycerol.
- e) The main objective of changing depreciation is/are ———
 - i) To show the asset at its proper value.
 - ii) To determine the accurate profit.
 - iii) To make provision for replacement of asset.
 - iv) All of the above.

P.T.O.

Q2) Attempt any FIVE of the following: **[10]**

- a) What is biotransformation? Give an example.
- b) What are depth and screen filters?
- c) What are immobilized enzymes? Enlist the methods of immobilization.
- d) Which properties an ideal antifoam agent should have?
- e) Explain Standard Operating Practices (SOPs).
- f) What is $K_L a$? Mention its importance in a fermentation process.
- g) Explain mass balance and its use in biotransformation.

Q3) Attempt any THREE of the following: **[15]**

- a) Describe the mechanism of depth filtration. Add a note on log penetration theory.
- b) What is medium optimisation? Explain Plackett-Burman design.
- c) Explain in detail the process for production of L-lysine.
- d) With the help of a diagram explain the construction of a bioreactor. Add a note on air lift fermenter.
- e) What are different methods of chromatography available for purification of biomolecules.



Total No. of Questions : 3]

[Total No. of Pages : 2

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[3919-A] - 22

B.Sc. (Applied)

BIOTECHNOLOGY

M-22/P-22: Ecology, Waste Management and Biodiversity

(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) *All the questions are compulsory.*
- 2) *Draw neat labelled diagram wherever necessary.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculators is allowed.*

Q1) Multiple choice questions.

[5 x 1 = 5]

- a) Ecological study of an organism is called as _____.
 - i) Synecology.
 - ii) Autecology.
 - iii) Ecology.
 - iv) None.
- b) The compound which is foreign to the biomolecular composition of cells is _____.
 - i) Toxin.
 - ii) Xenobiotic.
 - iii) Poison.
 - iv) None of these.
- c) DDT is _____ type of insecticide.
 - i) Organophosphate.
 - ii) Organochlorine.
 - iii) Carbamate.
 - iv) None of these.
- d) Ozonation of water is an example of _____ type of effluent treatment.
 - i) Primary.
 - ii) Preliminary.
 - iii) Secondary.
 - iv) Tertiary.
- e) _____ of the following is not an example of ex-situ conservation.
 - i) Artificial insemination.
 - ii) Embryo transfer.
 - iii) Cloning.
 - iv) Biosphere reserve.

P.T.O.

Q2) Attempt any Five of the following:

[5 x 2 = 10]

- a) Give reactions involved in depletion of ozone.
- b) Green house effect is essential for thriving life on earth: Why?
- c) Give reasons: Pyramid of biomass and number can sometimes be inverted.
- d) Enlist any 4 non-conventional energy sources.
- e) Define with example
 - i) Ecotone.
 - ii) Secondary pollutant.
- f) What is 'Industrial Ecology'?
- g) Compare and contrast In-situ and Ex-situ conservation strategies.

Q3) Answer any Three of the following:

[3 x 5 = 15]

- a) Elaborate on use of Biodiversity for maintaining ecological health.
- b) Explain homeostasis of an ecosystem with an example.
- c) With example explain how molecular basis of the cell can be used as a tool for classifying organisms.
- d) Explain the sources and mechanism of Los Angeles smog formation.
- e) Explain the ex-situ conservation strategies of the organisms.



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[3919-A] - 25

B.Sc. (Applied)

BIOTECHNOLOGY

M-25: Plant and Animal Tissue Culture

(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat, labelled diagram wherever necessary.*

Q1) Multiple choice questions.

[5 x 1 = 5]

- a) The most preferred carbon and energy source in PTC media is _____.
 - i) Glucose.
 - ii) Sucrose.
 - iii) Lactose.
 - iv) Fructose.
- b) The pore size of membrane filters is _____.
 - i) 0.22 µm.
 - ii) 0.30 µm.
 - iii) 0.70 µm.
 - iv) 0.90 µm.
- c) In Cryopreservation, cells are stored in _____.
 - i) Carbon dioxide.
 - ii) Oxygen.
 - iii) Liquid nitrogen.
 - iv) Helium.
- d) Cell suspension should be subcultured before it enters in _____ phase.
 - i) Log.
 - ii) Lag.
 - iii) Exponential.
 - iv) Stationary.
- e) Enzymatic dissociation of cells is done with _____.
 - i) PBS.
 - ii) Trypsin.
 - iii) Glycerol.
 - iv) DMEM.

P.T.O.

Q2) Attempt any Five of the following:

[5 x 2 = 10]

- a) What are the types of Media used in ATC? Give one example each.
- b) What is the working principle of an autoclave? How is it used for sterilization?
- c) What is the role of PGRs used in culture medium?
- d) What is the concept of hormonal regulation of invitro morphogenesis.
- e) What is serum?
- f) What is the difference between adherent cell culture and cell suspension culture? Give examples.
- g) Define somatic embryogenesis and mention its types.

Q3) Answer any Three in details.

[3 x 5 = 15]

- a) Comment on the composition and nutrient value of serum.
- b) How the growth of suspension culture is assessed?
- c) Write a note on the organization and requirements of a plant tissue culture laboratory.
- d) Discuss the various applications of ATC.
- e) Comment on the root culture technique and its applications.



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[3919-A] - 26
B.Sc. (Applied)
BIOTECHNOLOGY
M26/P26: Use of Computers
(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Figures to the right indicate full marks.*
- 3) Neat labelled diagrams must be drawn wherever necessary.*

Q1) Select the correct option:

[5]

- a) Following criterion characterises an algorithm.
 - i) Definiteness
 - ii) Infiniteness.
 - iii) Ambiguity.
 - iv) Time consuring.
- b) One of the advantages of database is
 - i) Relatively cheap.
 - ii) Data is isolated.
 - iii) Less number of files.
 - iv) Concurrent access.
- c) OMR is ——— device.
 - i) Input.
 - ii) Output.
 - iii) None of the above.
 - iv) Both (i) & ii).
- d) Internet explorer is used for ———
 - i) Chating.
 - ii) Browsing.
 - iii) Videoconferencing
 - iv) Networking.
- e) The overall design of the data base is called as. ———
 - i) Database administration.
 - ii) Database schema.
 - iii) Query execution.
 - iv) Data structure.

P.T.O.

Q2) Attempt any FIVE of the following:

[10]

- a) What is Modem?
- b) Explain the terms
 - i) RAM ii) ROM.
- c) What are the components of LAN?
- d) Explain the features of a printer.
- e) Distinguish between Wordpad and Notepad.
- f) Explain the term 'icon'.
- g) What is Medline?

Q3) Attempt any THREE of the following:

[15]

- a) Write an algorithm and draw a flowchart for finding if a given number is prime or not.
- b) Give an account of applications of Bioinformatics.
- c) Write a note on biological databases.
- d) List the magnetic storage devices. Explain anyone in detail.
- e) What is Multimedia? Give its applications.



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[3919-A] - 27
B.Sc. (Applied)
BIOTECHNOLOGY
M27/P27: Bioinformatics
(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat labelled diagrams wherever necessary.*

Q1) Multiple choice questions.

[5 x 1 = 5]

- i) Ab-initio structure predictions uses _____.
 - a) Protein information from scratch.
 - b) Evolutionary information.
 - c) Both A & B.
 - d) None.
- ii) In _____ database the proteins are grouped into hierarchies of classes, folds, super families and families.
 - a) PDB.
 - b) CATH.
 - c) SCOP.
 - d) None.
- iii) For the comparison of closely related sequences _____ scoring matrix is used.
 - a) BLOSUM 45
 - b) PAM 1000
 - c) PAM 250
 - d) PAM 1.
- iv) _____ is a metabolic pathway database.
 - a) PIR.
 - b) PRODOM.
 - c) PMC
 - d) KEGG.
- v) Proteins known as _____ are required fore some proteins for proper folding.
 - a) HSP.
 - b) Chaperons.
 - c) Both A&B.
 - d) Only D.

P.T.O.

Q2) Attempt any five of the following:

[5 x 2 = 10]

- a) What are 3 termination codons.
- b) Define EST and PCR.
- c) Differentiate protein domain & protein motif.
- d) Enlist types of PROSITE database.
- e) What is meant by 'the degeneracy of genetic code'?
- f) Enlist applications of sequence alignment.
- g) What is reverse complement of following DNA sequence? GTGG TGAAATCT.

Q3) Answer any three of the following:

[3 x 5 = 15]

- a) Give an account of applications of protein structure prediction.
- b) Explain dynamic programming.
- c) What is homology modelling? Mention the tools and web based server used for it.
- d) Give an account of NCBI.
- e) Illustrate the central dogma of molecular biology with a diagram.



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[3919-A] - 28
B.Sc. (Applied)
BIOTECHNOLOGY
P-21: Plant Tissue Culture - II
(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) *All questions are compulsory.*
- 2) *Figures to the right indicate full marks.*
- 3) *Draw neat and labelled diagrams wherever necessary.*

Q1) Multiple choice questions.

[5 x 1 = 5]

- a) _____ is used to control browning of cultures.
 - i) Vit.a
 - ii) Vit.c
 - iii) Vit. B₁₂
 - iv) Vit B₆.
- b) The first somatic hybrid was developed by _____.
 - i) P. Carlson.
 - ii) E.Cocking.
 - iii) J. Power.
 - iv) Melcher.
- c) The _____ is used for hairy root culture.
 - i) Stirred tank reactor.
 - ii) Air lift bioreactor.
 - iii) Bubble column reactor.
 - iv) Trickle bed reactor.
- d) _____ induces the Vir genes of Ti plasmid.
 - i) Opines
 - ii) Octopine.
 - iii) Acetosyringone
 - iv) Nopaline.
- e) Androgenesis was first reported by _____.
 - i) Bhojwani & Razdan.
 - ii) Guha & Maheshwari.
 - iii) Kanta & Maheshwari.
 - iv) Maheshwari & Maheshwari.

P.T.O.

Q2) Attempt any five of the following:

[5 x 2 = 10]

- a) In orchids, in ovule-embryo culture is used for micropropagation. - Justify.
- b) How the androgenesis is affected by the stage of microspore development?
- c) How the nature of plant material affects Cryopreservation?
- d) What are the salient features of isolated protoplasts?
- e) Compare and contrast between somatic hybrid and cybrid.
- f) 'Meristem is always free from pathogens'. - Comment.
- g) What are differences between genetic variations and epigenetic variations?

Q3) Answer any three questions in details:

[3 x 5 = 15]

- a) What are factors affecting androgenesis?
- b) How the culture conditions affects secondary metabolite production?
- c) Why the invitro raised plants require the transplantation stage?
- d) Discuss the structure of Ti plasmid with a suitable figure.
- e) How the protoplasts are cultured at low density.



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[3919-A] - 29
B.Sc. (Applied)
BIOTECHNOLOGY
P-25: Techniques in Microbiology
(Sem. - II)

Time : 1½ Hours]

[Max. Marks :30

Instructions to the candidates:

- 1) All questions are compulsory.*
- 2) Neat labelled diagrams must be drawn wherever necessary.*
- 3) Figures to the right indicate full marks.*

Q1) Select the correct option:

[5]

- a) All of the following are true about agar except:
 - i) It is a polysaccharide.
 - ii) It is a source of nutrients in Culture Media.
 - iii) It liquefies at 100°C
 - iv) It solidifies at approximately 40°C.
- b) Which of the following does not kill endospores?
 - i) Autoclaving.
 - ii) Pasteurization.
 - iii) Hot air sterilization.
 - iv) Incineration.
- c) Which of the following statements is not true?
 - i) Viruses contain DNA or RNA.
 - ii) The nucleic acid of a virus is surrounded by a proteincoat.
 - iii) Viruses cause the synthesis of specialized infectious elements.
 - iv) Viruses multiply inside living cells using viral mRNA, tRNA & ribosomes.
- d) Heat labile components are sterilized by –
 - i) Dry heat.
 - ii) Moist heat.
 - iii) Filtration.
 - iv) Both (i) and (ii).
- e) Which of the following is used in the production of citric acid?
 - i) Lactococcus lactis.
 - ii) Streptococcus mutans.
 - iii) Aspergillue niger.
 - iv) Both (ii) and (iii).

P.T.O.

Q2) Attempt any FIVE of the following: [10]

- a) Define accentuator. Write one example of the same.
- b) Differentiate between dry heat and moist heat as a means of sterilization.
- c) Enlist the microorganisms used in large scale production of enzymes.
- d) Compare Gram positive and Gram negative bacteria.
- e) Describe the principle of cultivation of viruses.
- f) Explain with an example chemically defined media.
- g) Diagrammatically enlist the bacterial growth curve phases.

Q3) Attempt any THREE of the following: [15]

- a) Describe different components used for preparation of bacteriological media.
- b) Explain any two methods of enumeration of bacteria.
- c) Write a note on role of bacteria in the fermentation industry.
- d) What is the need to stain bacteria? Write a note on Gram staining.
- e) Give an account of classification of bacteria on the basis of Bergey's Manual.

