



ANDHRA UNIVERSITY

TRANS-DISCIPLINARY RESEARCH HUB

PAPER-I: ADVANCED APPLIED BIOCHEMISTRY

Unit – I

Plant tissue culture: Culture media – Composition and preparation, Totipotency, Organogenesis and plant regeneration, Somatic embryogenesis, Artificial seeds, Micropropagation. Isolation and culture of protoplasts, Somatic hybridization. Production of secondary metabolites through *In vitro* culture.

Unit – II

Animal Cell Culture: Primary and established cell lines, Biology and characterization of the cultured cells, Culture media - Serum and serum free media, defined media and their applications, Viability and cytotoxicity assays: Trypan blue, MTT, TUNEL and ELISA based assays.

Unit – III

Stem cells – Sources - embryonic stem cells, adult stem cells, cord blood stem cells. Generation of stem cells by cloning, stem cell differentiation, stem cell plasticity, preservation of stem cells. stem cells for transplantation. Applications of stem cell therapy- Parkinson's disease and Alzheimer's disease. Gene therapy.

Unit – IV

Vaccines: Principles of vaccination, Design of vaccines, Conventional vaccines – Whole organism- inactive and attenuated, Purified macromolecules, New generation vaccines- Recombinant antigen vaccines, Recombinant vector vaccines, DNA vaccines, Synthetic peptide multivalent sub unit vaccines, Vaccine delivery systems – Liposomes, Micelles, ISCOMS;

Unit –V

Principle and applications of Antisense RNA, small interfering RNA. Nanotechnology - in Medicine, Food Science and Environment. Immunotechnology - Development of Monoclonal Antibodies by Hybridoma Technology, Applications of Monoclonal Antibodies and chimeric Monoclonal Antibodies.

Reference Books

1. "Essential Immunology" by Ivan M. Roitt (1980). (Blackwell Scientific Publications, Oxford, London) fourth edition.
2. Tissue Culture Theory and Applications Bhojwani SS and Razdan, Elsevier Publication.
3. "Plant Cell, Tissue, and Organ culture" by J Reinert and Y P S Bajaj.
4. Kuby Immunology- Owen, Punt, 10th ed
5. Animal Cell Culture Techniques. Ed. Martin Clynes, Springer



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Answer 5 questions. Each question carries equal marks.

1. a) Write the composition and preparation of Plant tissue culture medium
Or
b) Explain the concept of Somatic hybridization and production of cybrids.
2. a) What is established cell line and discuss about the advantages and limitations established cell lines over primary cell lines.
Or
b) Explain in detail about cell viability and cytotoxicity assays.
3. a) Write an essay on different types of stem cell.
Or
b) Write the applications of stem cell therapy. Give special emphasis on Parkinson's disease.
4. a) Describe the principle, design, applications of new generation vaccines.
Or
b) Give a detailed account on Vaccine delivery systems.
5. a) Describe the principle and applications of SiRNA.
Or
b) What are monoclonal antibodies? Discuss the production and application of Monoclonal antibodies.
6. a) Describe the principle, design, applications of new generation vaccines.
Or
b) Give a detailed account on Vaccine delivery systems.
7. a) Describe the principle, design, applications of new generation vaccines.
Or
b) Give a detailed account on Vaccine delivery systems.
8. a) Describe the principle, design, applications of new generation vaccines.