

**Electives : Group E Biotechnology
Paper X : Applied of Biotechnology**

Unit I

Cell and Tissue Culture Technology

Techniques in cell and tissue culture : Cell culture : Sources of cells – Techniques of cell culture : Mechanical, Biochemical – Equipments, culture media and procedures – small and large scale cultures – Storage, preservation and retrieval of cultures – Cell banking – cell lines and cloning. Tissue culture : Types of culture – Flask, test tube, organ, embryo culture – cell synchronization – measurement of cell death – Stem cell culture. Applications – stem cell culture and transplantation – Industrial products from cell cultures – cell culture as tool is production of hormones, pharmaceuticals and other products – cell culture as a tool in taxverty and pharmaceutical testing.

Reference:

1. Freshney I Animal cell culture Wiley Publishers Oxford 2000
2. Darling DC and Morgan SJ Animal cell culture and media BIOS Scientific Publishers 1994.
3. Mather JP and Barnes D Methods in cell biology Vol 57 : Animal cell culture methods 1998.
4. Harris A Epithelial cell culture University Press 1996
5. Ranga MM Animal Biotechnology Agrobios 2000.

Unit II

Immunotechnology

Hybridoma techniques and monoclonal antibody production – myeloma cell lines – fusion of myeloma cells with antibody producing B-cells-fusion methods – selection and screening methods for positive hybrids – cloning methods – production, purification and characterization of monoclonal antibodies. Application of monoclonal in biomedical research, in clinical diagnosis and treatment. Production of human monoclonal antibodies and their applications. Application of T-cell cloning in Vaccine development.

Reference:

1. Abbas AK, Lichtman AH and Pober JS Cellular and Molecular Immunology. WB Saunders Publications, London
2. Weir DM and Stewart J Immunology Churchill Livingstone, New York.
3. Roitt IM, Bronstaff J and Male DK Immunology Mosby, Toronto.
4. Kuby J Immunology WH Freeman and Company, New York.
5. Tizard TR Immunology : An Introduction Saunders College Publishers, Philadelphia.

6. technological Applications of Immunochemicals Open Universiteit (Nederland) and University of Greenwich (United Kingdom).

Unit III

Reproductive Technology

Introduction to Assisted Reproductive Technology :

Male : Indications for male ART-Causes of problems in Male Reproduction (Developmental, Hormonal, Environmental, Dietary, Genetic, Infections) – MART – Sperm collection / retrieval of sperm by aspiration –semen analysis – sperm function test –cryopreservation of sperm.

Female : Indications for FART-Causes of problems in female reproduction (Hormonal) imbalance, Tubal blockage, polycystic ovary syndromes, Endometriosis) – FART – Multiple ovulation – Collection of ova – identification of viable ova-Processing of ova-In vitro maturation of ova.

Choices in bringing about fertilization -IUI-PZD-SUZI-ICSI- Processing of fertilized ova – Blastocyst culture – Embryo transfer and implantation – Cryopreservation of blastocysts.

Applications of reproductive technology in cattle management.

Reference:

1. C.P. Puri & P.F.A. Van Look (1999) Recent Advances in Fertility and contraception. Wiley Eastern Ltd., New Age International Ltd., New Delhi

Unit IV

Aquaculture Technology

Transgenic fish – Transfer of antifreeze protein, aquarin gene and stress protein to fishes – Methods of transgenic delivery.

Breeding technology – Induced breeding – for improving productivity, Induction of morphological variations in fancy fishes.

Disease diagnosis and management technology : Disease diagnosis by PCR technique, Management of diseases by Immunization, Vaccine delivery, Monoclonal antibody, chemotherapy, etc.

Culture Technology : Culture of fishes, mollusks and crustaceans and its applications in production of steroid hormones, culture of pearl oyster mantle to produce pearls.

Reference:

1. Fingerman M and Nagabushanam R Recent Advances in Marine Biotechnology Oxford and IBH Publishing co Pvt Ltd.
2. Biswas KP Prevention and control of fish and prawn diseases Narendra Publishing House, 2000
3. Pillay TVR Aquaculture – Principles and Practices Fishing News Books.

Unit V

Environmental Biotechnology

Role of Biotechnology in Environment Protein – What is Environmental Biotechnology? Current status of Biotechnology in Environmental Protection – Future.

Bioreactors for waste water Treatment : Biological Processes for Industrial effluent Treatment, Aerobic Biological Treatment, Anaerobic Biological Treatment, Periodic Biological Reactors, Membrane Bioreactors, use of Immobilized Enzymes and microbial cells, Bioaugmentation, Packaged Microorganisms, use of Genetically Engineered Organisms. Removal of specific Pollutants, Sources Heavy Metal Pollution, Microbial systems for Heavy Metals Accumulation, Biosorption, Bioleaching, Bioremediations.

Biotechnology for Hazardous Waste Management, Biotechnology for Industries : SCP and Biomass from Waste, Tannery Industry, Paper Industry and Biotechnology, Novel methods for Pollution control : Deodorization Process, Vermitechnology, Waste Water Treatment using Aquatic Plants, Root Zone Treatment. Aiming for Biodegradable and Eco-friendly Products.

Reference:

1. Gareth M. Evans and Judith C.Furlong. Environmental Biotechnology and Application. John Wiley and Sons, Ltd., 2003, USA.
2. Laurent Lagatic, Thierry Caquet, Jean-claude Amiard & Francois Ramade. Use of Biomarkers for Environmental quality Assessment. Oxford & IBH Publishing Co., Pvt., Ltd., New Delhi, Calcutta, 2000
3. Ursula Bilitewski and Anthony P.f.Turner. Biosensors for Environmental Monitoring. Harwood Academic Publisher, India 2000
4. Robert F.Hickey and Gretchen Smith. Biotechnology in Industrial water treatment and Bioremediation. Lewis Publisher, London, 1996.
5. Jack E.Rechical and Nancy A. Rechical. Biological and Biotechnological control of Insect Press. Lewis Publisher, Washington, D.C.1998.