2016-17

B.Sc. III YEAR (BIOTECHNOLOGY)

Semester V

Paper: Immunology and Animal Biotechnology

Maximum Marks: 85

Unit I

Normal flora of Human body.
Infection and its types.
Mechanism of pathogenesis.
Organs of Immune system- Spleen, Thymus, Lymph nodes
Cells of Immune system- T cells- its types and receptors, B cells and its receptors.
Immunity- Innate and Acquired, Humoral and cell-mediated immunity.
Host defense mechanism- First, Second and Third Line of Host Defense.
Primary and Secondary response.

Unit II

Antigens- Properties and types, Adjuvants.
Immunoglobulins- Structure, types and functions.
Generation of Antibodies.
Agglutination and Precipitation reactions.
Hemagglutination and Passive Hamagglutination, Immunofluorescence, ELISA, RIA, Coombs test (Direct and Indirect), Latex agglutination, ODD and RID.

Unit III

Structure and organisation of animal cell.
Equipment and materials for animal cell culture Technology.
History and development of cell culture.
Culture media for animal cell culture – BSS, Serum containing and serum free media
Growth factors – EGF, ECF, PDGF, IL-1, IL-2, NGF and Erythropoitin.

Unit IV

Physical requirements for growing animal cells in culture.
Initiation of cell culture.
Isolation and disaggregation of explants.
Development of primary culture.
Commonly used cell lines – their organization and characteristics.
Growth curve of animal cell in culture.
Differentiation of cells.
Organ culture – techniques, advantage and appiications.

Unit V

Methods of Transfection of animal cells.
Methods of cell fusion.
Selectable markers, HAT selection.
Transgenic animals, Stem cell culture.
Transplantation of cultured cells.
Bioreactors for large scale production of animal cells.
Design and Types of Bioreactors.

जैव प्रौद्योगिकी विभाग
देवी अहिल्या विश्वविद्यालय
इन्दौर

16/5/16

RECOMMENDED BOOKS

1. Genes XI, Author- B. Lewin.
2. Principles of Genetics, Authors- Gardner, Simmons and Snustad.
3. Concepts of Genetics, Authors- Klug and Cummings.
4. Microbial Genetics, Authors- Freifelder.
5. Genetics, Authors- Arora and Sandhu.
6. Cell Biology and Genetics, P.S. Verma and Agrawal.
7. Text of Microbiology, Authors- Ananthanarayanan and Paniker.
8. Immunology, Author- J. Kuby.
9. Nighojkar and Nighojkar, Experiments in Biotechnology.
10. Fundamental Immunology, Author– W.E. Paul.
11. Fundamentals of Immunology, Authors– Coleman, Lombord and Sicard.
12. Immunology – Weir and Steward.
13. Immunology, A. Textbook, Author- C.V. Rao.
14. Lecture Notes in Immunology, Author- I.R.Todd.
15. Text book of Animal Biotechnology, Ramdas and Mecraya,
16. Biotechnology Animal cell, Satish M.K.
17. Animal Biotechnology, Ranga M.M.
18. Animal Biotechnology, Shashidhara R.
19. Text Book of Biotechnology, B.D. Singh. Culture of Animal cell, Freshney.

SEMESTER V - EXPERIMENTS

1. UV as physical mutagen.
2. Gradient plate technique.
3. Antibiotic sensitivity test.
4. Blood group analysis.
5. Total count of WBC
6. Total count of RBC
7. To perform the differential count of WBC.
8. To examine Flocculation reaction using VDRL test.
9. To observe the agglutination reaction using WIDAL test
10. Determine the concentration of unknown antigen using Radial Immuno Diffusion technique.
11. To determine the antibody antigen reaction by performing ODD technique.
12. Enzyme Linked Immuno Sorbent Assay.

Scheme of Practical Examination (2 days minimum 3hrs each day)

1. Perform Immuno Assay- ELISA/ODD/ RID	12
2. Total Count of WBC/RBC/Differential WBC counts.	10
3. UV as a Physical mutagen/ Gradient Plate Techniques	10
4. Spotting	08
5. Viva.	05
6. Practical Record.	05

जैव (वनस्पति) विभाग
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2016-17

B.Sc. III YEAR (BIOTECHNOLOGY)

Semester VI

Paper: Plant and Environmental Biotechnology

Maximum Marks: 85

Unit I

Introduction to and history of plant tissue culture.
MS Media for plant tissue culture.
Use of Growth regulators.
Selection and maintenance of callus.
Single cell culture.

Unit II

Cytodifferentiation.
Micropropogation.
Organogenesis.
Somatic Embryogenesis.
Synthetic Seed and its application.
Haploid Plants- Anther and Ovary culture.
Production of haploids and their uses.
In vitro pollination.
In vitro fertilization.

Unit III

Protoplast isolation, testing of viability, regeneration of protoplast and protoplast fusion.
Markers for selection of hybrid cell.
Practical applications of somatic hybridization, Introduction to Cybrids.
Introduction to transgenic plants.
Genetic manipulation of plants-use of *Agrobacterium tumifaciens* and *A. rhizogenes.*
Transfection methods
Advantages of Transgenic Plants.

Unit IV

Conventional fuels-firewood, plant, coal gas, animal oils and environmental impact.
Modern fuels-Methanogenic bacteria and biogas, microbial hydrogen production, gasohol experiment, solar energy.
Plant based petroleum industry.
Cellulose degradation for combustible fuels and their environmental impact.
Microbial leaching of copper and uranium.
Biorecovery of petroleum-MEOR
Bioremediation and Biodeterioration- Petroleum products, leather, textile and paper.

Unit V

Biopesticides- Bacterial and Fungal.
Genetically modified crops containing insecticidal genes.
Biofertilizers-Nitrogen fixers, PSB, Mycorrhiza and VAM.
Biosensors and Biopolymers.
Biochips, Biofilms and Bioplastics.
Microorganisms as Bioindicators.
Biological weapons and bioterrorism.

16/5/16

RECOMMENDED BOOKS

1. Plant Biotechnology, Jitendra Parkash.
2. Biotechnology in plant science. Kumar N C.
3. Trends in Plant tissue culture and biotechnology, Pareek L K
4. Biotechnology in Agriculture, Natesh S.
5. Genetic Engg. and Biotechnology, B.D. Singh.
6. Plant Biotechnology, Slater Scott.
7. Plant Biotechnology, Chawla.
8. Environmental Microbiology, Authors-Majer, Pepper and Gerba.
9. Environmental Microbiology, Authors-P.D. Sharma.
10. Environmental Microbiology, Authors- K.G. Vijaya.
11. Introductory Food Microbiology, Author –H.A. Modi.
12. Microbial Biotechnology, Hazarre.
13. Environmental Biotechnology, Vishista.
14. Text book of Environmental Biotechnology, Mahaptara, Pradeep T.A.
15. Environmental Biotechnology, Agrawal S.K.
16. Text book of Animal Biotechnology, Ramdas and Mecraya.
17. Biotechnology Animal cell, Satish M.K.
18. Animal Biotechnology- Ranga M.M.
19. Animal Biotechnology, Shashidhara R.
20. Text Book of Biotechnology, B.D. Singh. Culture of Animal Cell, Freshney

SEMESTER VI – EXPERIMENTS

1. Introduction to plant tissue culture techniques.
2. Media preparation and sterilization.
3. Various method of surface sterilization of explants.
4. Seed germination in-vitro for aseptic collection of explants.
5. Micropropagation.
6. Callus induction from leaf, stem and roots.
7. Organogenesis.
8. Somatic embryogenesis.
9. Suspension culture propagation and uses.
10. Protoplast isolation and culture.
11. Demonstrate the enzymatic conversion of ammonia to nitrates by soil microorganisms.
12. Isolation of Rhizobium from root nodules.
13. Isolation of Azotobacter from soil.

Scheme of Practical Examination

1. Protoplast isolation and culture.	12
2. Seed germination / Preparation of synthetic seeds.	10
3. Another culture (check the viability) /Histological study of callus.	10
4. Spotting	08
5. Viva.	05
6. Practical Record.	05

16/5/16