Prof. R. P. Mandhan

Paper BT-121 Animal Biotechnology

Date & Time	Topic	Sub-Topics
19-01-2015 (3:00-4:00 pm)	**Somatic Cell Genetics**	***Production of hybrid cells***
20-01-2015 (3:00-4:00 pm)	**Somatic Cell Genetics**	***Properties of hybrids***
22-01-2015 (3:00-4:00 pm)	**Somatic Cell Genetics**	***Applicationscellsofhybrid***

References:

1 *Animal Cell Culture - Practical Approach*, Ed. John R.W. Masters, OXFORD.

DR. Ritu Mahajan

For M.Sc. Students

Subject taken – **Enzyme Technology (BT110)**

Outline of the lectures to be delivered this week – i.e. January 19 to January 24, 2015

- History of enzymology
- General view of enzymes
- Application of enzymes

Books for reference:-
Fundamentals of Enzymology by Price and Stevens
Enzymes by Palmer and Bonner
Enzyme in Industry, production and application VCH by Gerhartz
Industrial Biotechnology by Jogdand
Biotechnology by B D Singh
Enzymes by Devasena

For Ph.D. Students

Outline of the lecture to be delivered to Ph.D. students

- Historical background of enzymes
- General view and applications of enzymes

Dr. Raman Saini

Lesson plan for the period from 19/01/ 2015 to 24/01/2015

Paper: BT- 109B

Topic	Outlines of the topic
Introduction to plant cell and tissue culture	Discuss the types of Plant tissue culture and basics of PTC
Historical perspective	Discuss the timeline achievements/ events in PTC
References: Plant tissue culture – Theory and Practice (2005) by Bhojwani S. S. and Razdan M. K., Elsevier publication. Biotechnology in crop improvement (1998) by H. S. Chawla, International Book distributing company.	

Paper: BT- 120

Topic	Outlines of the topic
Bioremediation of fuel oils and lubricants in soil and water	Pretreatment Assessment, Oil and lubricants types their properties
References: Biodegradation and Bioremediation: Soil Biology. Singh A. and Ward O.P. (2004), Springer Bioremediation Protocols. David S. (1997), Humana Press, New Jersey. Environmental Biotechnology. Agarwal S. K. (1998), APH Publishing Corporation, New Delhi.	

Paper : BT- 121

Topic	Outlines of the topic
Cryobanking of germplasm	Definition, methods of germplasm preservation, materials for crypreservation
References: Culture of Animal Cells, (3rdedition), R. Ian Freshney. Wiley-Liss. Animal Cell Biotechnology, Vol. 1-6 Spier, R.E. and Griffiths, J.B. (eds), Academic Press. Animal Cell Culture - Practical Approach, Ed. John R.W. Masters, OXFORD. Animal Cell Culture Methods In: Methods in Cell Biology, Vol. 57, Ed. Jenni P Mather and David Barnes, Academic Press. Biotechnology, Vol. 7b 1993 Rehm. H.J. and Reed, G.(eds) VCH Publications.	

Paper: Research methodology (Ph. D.)

Advances in plant tissue culture

Dr. Sunita Dalal

19 jan 2015-----introduction to bioinformatics(defination and applications)
20/1/15 upto 27 /1/15 ::CL

28/1/15: biological database
29/1/15:format of database,retrival systems.

Dr. Bindu Battan

Lesson-plan for session 2014-2015 (II-Semester)

Subject: Principles of Genetic Engineering (BT-107)

Unit-1

Lesson 1: Introduction and scope of genetic engineering, what is gene cloning, milestones in genetic engineering, Central role of *E.coli* in Genetic engineering

Lesson 2: Purification of total cell DNA: Growing and harvesting a bacterial culture, preparation of a cell extract, purification of DNA from a cell extract, concentration of DNA samples and their measurement.

Lesson 3: Preparation of plasmid DNA: Separation on the basis of size and conformation, plasmid amplification, Preparation of bacteriophage DNA: Growth of cultures to obtain a high titre, preparation of non-lysogenic phages, collection of phages from an infected culture, purification of DNA.

Lesson 4: Nucleic acid blotting: Southern, Northern, western and hybridization: colony hybridization, dot-blot hybridization

Lesson 5: Manipulation of purified DNA: The range of DNA manipulative enzymes, Nucleases, Ligases, Polymerases, DNA modifying enzymes, topoisomerases, methylases, Enzymes for cutting DNA- restriction endonuleases: discovery and function of restriction endonucleases, types of restriction enzymes, type II restriction endonuclease cut at specific nucleotide sequence.

Lesson 6: Blunt and sticky ends of restriction enzymes, Nomenclature, applications of restriction endonucleases. Ligases: joining DNA molecules together, the mode of action of DNA ligase, sticky ends increase the efficiency of ligation, putting sticky ends onto a blunt-ended molecule, linkers, adaptors, producing sticky ends by homopolymer tailing.

Lesson 7: Gene cloning vectors: Plasmids: basic feature of plasmids, size and copy number, conjugation and compatibility, plasmid classification, nomenclature of plasmid cloning vectors, useful properties of pBR 322, more sophisticated E,coli plasmid cloning vectors, Bacteriophages: basic feature of bacteriophages, lysogenic phages, gene organization in the molecule, linear and circular forms of λ DNA, M13- a filamentous phage, attraction of M13 as a cloning vector, development of the M13 cloning vectors, hybrid plasmid-M13 vectors.

Lesson 8: Cloning vectors based on λ bacteriphages: insertion and replacement vectors, phagemids, cosmids, artificial chromosomes: YAC, BAC, PAC.

Dr. Sulekha Rani

Paper BT-121 Animal Biotechnology

Lesson Plan

Topic- Gene Transfer into Animal Cells and Transgenic animals (Unit-II)

- **Points to discuss**

➢ To describe the different protocols available for DNA transfer methods for mammalian cells i.e.

1. calcium phosphate precipitation,
2. DEAE-dextran procedure,
3. polycation DMSO,
4. microinjection,
5. electroporation,
6. Viral vectors (SV40, adenovirus, vaccinia, bovine papiloma virus, baculovirus,retrovirus).

along with their advantages and limitations and latest advancements.

➢ To elaborate the utility of markers for selection of transfected cells
➢ Cite appropriate examples for Selectable and a Scorables markers
➢ Discuss Methodology and applications of transgenic animal's i.e. transgenic mice, transgenic cattle and transgenic Livestock.
➢ Explain Methods of drugs production using animals

Recommended Books:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA
By- Glick, B.R. and Pasternak, J.J., ASM Press, USA.
2. Principals of Gene Manipulation and Genomics
By- Primose, S. B and Twyman, R.M., Blackwell Publishing.
3. Recombinant DNA
By- Watson, J.D., Gilman,M., Witkowski,J. and Zoller,M., Scientific American Books.

Paper BT-109A Animal Cell & Tissue Culture

Lesson Plan 1

Topics- Animal cell and tissues culture, its requirements & techniques

- Points to discuss
- Introduction of the Concept
- Historical background
- Developments
- Advantages and limitations of cell & tissue culture
- Aseptic area, incubation, preparation and sterilization
- Storage, specialized equipment, consumable items
- Elements of aseptic environment i.e. sterile handling, laminar flow and standard procedures
- Culture vessels and substrates

Recommended Books:

1. Culture of Animal Cells, (5th edition), R. Ian Freshney. Wiley-Liss.
2. Animal Cell Culture - Practical Approach, Ed. John R.W. Masters, OXFORD.
3. Animal Cell Culture Methods In: Methods in Cell Biology, Vol. 57, Ed. Jenni P Mather and David Barnes, Academic Press.
3. Animal Cell Culture Techniques. Ed. Martin Clynes, springer.
4. Biotechnology, Vol. 7b 1993 Rehm. H.J. and Reed, G.(eds) VCH Publications.
5. Cell Culture Lab Fax. Eds. M Butler & M. Dawson, Bios Scientific Publications Ltd. Oxford.
6. Cell Growth and Division: a Practical Approach. Ed. R. Basega, IRL Press.

Lesson Plan 2

Topics- Media and supplements

Points to discuss

- physicochemical properties,
- balanced salt solutions,
- complete media,
- role of serum and supplements,
- serum free media,
- Advantages, disadvantages and development of serum and serum free media

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1. Culture of Animal Cells, (5th edition), R. Ian Freshney. Wiley-Liss.
2. Animal Cell Culture - Practical Approach, Ed. John R.W. Masters, OXFORD.
3. Animal Cell Culture Methods In: Methods in Cell Biology, Vol. 57, Ed. Jenni P Mather and David Barnes, Academic Press.
3. Animal Cell Culture Techniques. Ed. Martin Clynes, springer.
4. Biotechnology, Vol. 7b 1993 Rehm. H.J. and Reed, G.(eds) VCH Publications.
5. Cell Culture Lab Fax. Eds. M Butler & M. Dawson, Bios Scientific Publications

Ltd. Oxford.
6. Cell Growth and Division: a Practical Approach. Ed. R. Basega, IRL Press.

Lesson Plan 3

Topics- Primary culture, Sub-culturing and Cloning

Points to discuss

- types of primary cell culture,
- isolation of the tissue,
- Subculture and propagation,
- Criteria for subculture,
- growth cycle and split ratio,
- propagation and subculture in suspension,
- large scale production of cells using bioreactors, microcarriers and perfusion techniques.

Recommended Books:

2. Culture of Animal Cells, (5th edition), R. Ian Freshney. Wiley-Liss.
2. Animal Cell Culture - Practical Approach, Ed. John R.W. Masters, OXFORD.
3. Animal Cell Culture Methods In: Methods in Cell Biology, Vol. 57, Ed. Jenni P Mather and David Barnes, Academic Press.
3. Animal Cell Culture Techniques. Ed. Martin Clynes, springer.
4. Biotechnology, Vol. 7b 1993 Rehm. H.J. and Reed, G.(eds) VCH Publications.
5. Cell Culture Lab Fax. Eds. M Butler & M. Dawson, Bios Scientific Publications Ltd. Oxford.

Lesson Plan 4

Topics- Cell line characterization and Applications of animal cell culture

Points to discuss

- Need for characterization and authentication of cell lines,
- Cell morphology, chromosome content and DNA content,
- RNA and protein expression of cell lines,
- Enzyme activity & antigen markers analysis for further characterization.
- Production of high value therapeutics: enzymes, hormones, monoclonal antibody, cytokines, tissue plasminogen activators.
- Applications of animal cell culture in virology, cancer research, gene therapy, drug
- development and cytotoxicity,
- animal cloning,
- genetic counseling,
- and preservation methods (cryopreservation)

Recommended Books:

1.Culture of Animal Cells, (5th edition), R. Ian Freshney. Wiley-Liss.
2. Animal Cell Culture - Practical Approach, Ed. John R.W. Masters, OXFORD.
3. Animal Cell Culture Methods In: Methods in Cell Biology, Vol. 57, Ed. Jenni P

Mather and David Barnes, Academic Press.
3. Animal Cell Culture Techniques. Ed. Martin Clynes, springer.
4. Biotechnology, Vol. 7b 1993 Rehm. H.J. and Reed, G.(eds) VCH Publications.
5. Cell Culture Lab Fax. Eds. M Butler & M. Dawson, Bios Scientific Publications Ltd. Oxford.

Paper BT-120 Environmental Biotechnology

Lesson Plan 1

Topics- Treatment of Waste water and industrial effluents

- **Points to discuss**

- Origin and composition of waste water
- Introduction of Physical, chemical and biological treatment methods
- Different biological methods in detail – i.e. aerobic processes and anaerobic processes
- Aerobic processes: activated sludge, oxidation ponds,trickling filter towers, and rotating discs
- Anaerobic processes: anaerobic digesters, anaerobic filters and upflow sludge blanket reactors.
- Microbiology and biochemistry of aerobic and anaerobic waste water treatment processes.
- Treatment of distillery effluent, paper and pulp mill effluent,tannary effluent, textile dye effluent, removal of heavy metals from waste waters

Recommended Books:

1. Environmental Chemistry. A.K. De, Wiley Eastern Ltd., New Delhi.
2. Introduction to Biodeterioration. D. Allsopp and K.J. Seal, ELBS/Edward Arnold.
3. Environmental Biotechnology. Agarwal S. K. (1998), APH Publishing Corporation, New Delhi.
4. Bioremediation Protocols. David S. (1997), Humana Press, New Jersey.
5. Environmental Science and Technology. Stankey E.M. (1997), Lewis Publishers, New York.
6. Microbial Biotechnology. Glazer and Nikaido (1998), WH Freeman & Company, New York.
7. Biodegradation and Bioremediation: Soil Biology. Singh A. and Ward O.P. (2004), Springer
8. S.C. Bhatia (2011), Industrial Biotechnology, Shree Publishers and Distributors,New Delhi

Lesson Plan 2

Topics- Microbial Insecticides, Biofertilizers, Bioleaching and Biodeterioration

- **Points to discuss**

- Bacteria, fugi and viruses for use as Insecticides
- Use of R-DNA technology to enhance the efficacy microbial insecticides.
- Composition and application of Biofertilizers
- Microbes in oil recovery and bioleaching

- Biodeterioration of stored plant food materials, leather, wool, metals, textiles, stone
- And Control of microbial bideterioration**.**

Recommended Books:

1. Environmental Chemistry. A.K. De, Wiley Eastern Ltd., New Delhi.
2. Introduction to Biodeterioration. D. Allsopp and K.J. Seal, ELBS/Edward Arnold.
3. Environmental Biotechnology. Agarwal S. K. (1998), APH Publishing Corporation, New Delhi.
4. Bioremediation Protocols. David S. (1997), Humana Press, New Jersey.
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6. Microbial Biotechnology. Glazer and Nikaido (1998), WH Freeman & Company, New York.
7. Biodegradation and Bioremediation: Soil Biology. Singh A. and Ward O.P. (2004), Springer
8. S.C. Bhatia (2011), Industrial Biotechnology, Shree Publishers and Distributors,New Delhi