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III, V, VI
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3+2
3+2

ZOOLOGY SYLLABUS FOR V SEMESTER

ZOOLOGY - PAPER - V

ANIMAL BIOTECHNOLOGY

Periods: 60

Max. Marks: 100

Unit 1: Tools of Recombinant DNA technology - Enzymes and Vectors

Restriction modification systems: Types I, II and III. Mode of action, nomenclature, applications of Type II restriction enzymes in genetic engineering

DNA modifying enzymes and their applications: DNA polymerases, Terminal deoxynucleotidyl transferase, kinases and phosphatases, and DNA ligases

Cloning Vectors: Plasmid vectors: pBR and pUC series, Bacteriophage lambda and M13 based vectors, Cosmids, BACs, YACs,

Unit 2 Techniques of Recombinant DNA technology

Cloning: Use of linkers and adaptors

Gene delivery: Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated delivery

PCR: Basics of PCR.

DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing

Hybridization techniques: Southern, Northern and Western blotting.

Genomic and cDNA libraries: Preparation and uses

UNIT 3 Animal Cell Technology

Cell culture media: Natural and Synthetic

Cell cultures: primary culture, secondary culture, continuous cell lines; Protocols for Primary Cell Culture; Established Cell lines (common examples such as MRC, HeLa, CHO, BHK, Vero); Organ culture; Cryopreservation of cultures.

Hybridoma Technology: Cell fusion, Production of Monoclonal antibodies (mAb), Applications of mAb

Stem cells: Types of stem cells, applications

Unit 4 Reproductive Technologies & Transgenic Animals

Manipulation of reproduction in animals: Artificial Insemination, *In vitro* fertilization, super ovulation, Embryo transfer, Embryo cloning

Transgenic Animals: Strategies of Gene transfer; Transgenic - sheep, - fish; applications

Unit 5 Applied Biotechnology

Industry: Fermentation: Different types of Fermentation: Short notes on - Submerged & Solid state; batch, Fed batch & Continuous; Stirred tank, Air Lift, Fixed Bed and Fluidized; Downstream processing - Filtration, centrifugation, extraction, chromatography, spray drying and lyophilization

Agriculture: fisheries - monoculture in fishes, polyploidy in fishes; DNA fingerprinting

ZOOLOGY PRACTICAL SYLLABUS FOR V SEMESTER
ZOOLOGY - PAPER - V
ANIMAL BIOTECHNOLOGY

Periods: 24

Max. Marks: 50

Any SIX of the following:

1. Maintenance and storage of *E. coli* DH5 alpha cells. ✓ 1/4 psw
 2. DNA quantification using agarose gel electrophoresis (by using lambda DNA as standard).
 3. Preparation for insertion and vector for ligation.
 4. Preparation of competent cells ✓ (CaCl₂)
 5. Transformation of *E. coli* with plasmid DNA using CaCl₂. ✓
 6. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting
 7. Amplification of DNA by PCR ✓
 8. Packing and sterilization of glass and plastic wares for cell culture. ✓
 9. Preparation of culture media. ✓
- Wrote with CaCl₂ ✓*

SUGGESTED READING

1. Brown TA. (2010). Gene Cloning and DNA Analysis. 6th edition. Blackwell Publishing, Oxford, U.K.
2. Clark DP and Pazdernik NJ. (2009). Biotechnology: Applying the Genetic Revolution. Elsevier Academic Press, USA
3. Primrose SB and Twyman RM. (2006). Principles of Gene Manipulation and Genomics. 7th edition. Blackwell Publishing, Oxford, U.K.
4. Sambrook J and Russell D. (2001). Molecular Cloning-A Laboratory Manual. 3rd edition. Cold Spring Harbor Laboratory Press
5. Wiley JM, Sherwood LM and Woolverton CJ. (2008). Prescott, Harley and Klein's Microbiology. McGraw Hill Higher Education
6. Brown TA. (2007). Genomes-3. Garland Science Publishers
7. Primrose SB and Twyman RM. (2008). Genomics: Applications in human biology. Blackwell Publishing, Oxford, U.K.
8. Animal Cells Culture and Media, D.C. Darling and S.J. Morgan, 1994. BIOS Scientific Publishers Limited.
9. Methods in Cell Biology, Volume 57, Jennie P. Mathur and David Barnes, 1998. Animal Cell Culture Methods Academic Press.
10. P.K. Gupta: Biotechnology and Genomics, Rastogi publishers (2003).
11. B.D. Singh: Biotechnology, Kalyani publishers, 1998 (Reprint 2001)

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ZOOLOGY MODEL PAPER FOR V SEMESTER

ZOOLOGY PAPER-V

ANIMAL BIO-TECHNOLOGY

Time: 3 hrs

Max Marks:75

- I. Answer any **FIVE** of the following:
Draw labeled diagrams wherever necessary

5x5=25 marks

1. Restriction Enzymes
2. DNA Polymerase
3. PBR Vector
4. Microinjection Technique
5. PCR
6. Cryopreservation
7. In Vitro Fertilization
8. Chromatography

- II. Answer any **FIVE** of the following
Draw labeled diagrams wherever necessary

5x10=50 marks

9. Describe DNA modifying enzymes and their applications
OR

Describe cloning vectors with examples

10. Enumerate recombinant DNA technology
OR

Describe the techniques involved in gene delivery system.

11. Define animal cell technology and describe the various cell culture techniques
OR

Define Hybridoma Technology

12. Describe reproductive technologies in animals
OR

Define Embryo Transfer and Embryo cloning

13. Describe different types of fermentation mechanisms
OR

Enumerate the processes involved in Downstream processing

BIOTECHNOLOGY PRACTICAL SYLLABUS FOR V SEMESTER 2017-18
ANIMAL BIO-TECHNOLOGY

Time: 2 hrs

Max Marks: 50

1. Major experiment: prepare the vector for ligation 20 marks
2. Minor Experiment: Prepare the competent cells 10 marks
3. Identify the spotters describe & important characters with labeled diagram 2x5=10 marks
 - a. PCR
 - b. Clone-Dolly
4. Certified Record 10 marks

50 marks

Pranav (Chair Person)
D. S. S.