**zoology syllabus for V semester**

**ZOOLOGY - PAPER - V**

**ANIMAL BIOTECHNOLOGY**

**Periods:60 Max. Marks:100**

 **ZOO5311 Credits-4**

**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

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**zoology practical syllabus for V semester**

**ZOOLOGY - PAPER - V**

**ANIMAL BIOTECHNOLOGY**

**Periods: 24 Max. Marks: 50**

 **ZOO-5311P CREDITS-2**

Any SIX of the following:

1. Maintenance and storage of*E.coli* DH5 alpha cells.

2. Isolation of Plasmid DNA from *E.coli*

**3.** Preparation of genomic DNA from *E. coli*/animals/ human.

4. DNA quantification using agarose gel electrophoresis (by using lambda DNA as standard).

5. Restriction digestion of lambda (λ) DNA using EcoR1 and Hind III.

6. Preparation for insertion and vector for ligation.

7. Performance of ligation reaction using T4 DNA ligase.

8. Preparation of competent cells

9. Transformation of *E. coli* with plasmid DNA using CaCl2,

10. Selection of transformants on X-gal and IPTG

11. Techniques: Western Blot, Southern Hybridization, DNA Fingerprinting

12. Interpretation of sequencing gel electropherograms

13. Amplification of DNA by PCR

14.Packing and sterilization of glass and plastic wares for cell culture.

15,Preparation of culture media.

**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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