BACHELORS WITH ZOOLOGY AS MAJOR (CT – II)

6th SEMESTER

ZOL622J2 ZOOLOGY _ PRINCIPLES OF ANIMAL GENETICS

CREDITS: THEORY: 04; PRACTICAL: 02

COURSE OBJECTIVE:

The learner will understand the principles of genetics.

Learning Outcome*:*

The learner will get the knowledge of genomics, inheritance, mapping, genetic diseases & human genome project and will utilize the knowledge to elucidate disease mechanisms, gene cloning and the pedigree analysis.

THEORY (4 CREDITS)

UNIT I: INHERITANCE BIOLOGY

1.1 Mendelian and non-Mendelian inheritance
1.2 Concept of gene: allele, multiple alleles, pseudoalleles & lethal alleles
1.3 Sex determination and sex-linked characteristics; dosage compensation in mammals
1.4 Gene interactions: complementary and supplementary genes; Pleiotropy

UNIT II: GENOMICS AND MAPPING

2.1 Concept of genomics and human genomeproject
2.2 Genetic mutations: gene & chromosomal
2.3 Genetic disorders and pedigree analysis
2.4 Linkage & Linkage maps

UNIT III: POPULATION GENETICS

3.1 Ecological genetics & polymorphism - phenotypic & genotypic polymorphisms
3.2 Genetic drift & genetic equilibrium
3.3 Hardy-Weinberg law& its applications
3.4 Inbreeding & outbreeding; causes & reasons of inbreeding: heterosis

UNIT IV: MOLECULAR GENETICS

4.1 Gene cloning: an overview
4.2 Restriction endonucleases: types & end modification enzymes
4.3 Extraction and purification of nucleic acids; PCR & gel electrophoresis
4.4 Vectors: plasmid & cosmid; gene library

PRACTICALS (2 CREDITS)

1. Study of Human Karyotypes (Normal/abnormal)
2. Study of Barr body through stained slides of squamous epithelial / neutrophil cells
3. Rearing of fruit fly and study of red and white character after crossing
4. Study of polytene chromosomes from chironomus larvae
5. Gel Electrophoresis
6. Demonstration of PCR via virtual mode
7. Demonstration of chromatography via virtual mode

SUGGESTED BOOKS / READING MATERIAL

1. Genes IX by Benjamin Lewin Jones and Bartlett Publishers
2. Genomes by Brown, T.A Garland Science Publishing, London, UK
3. Molecular Biology of Gene by Watson et al. Pearson Education, Delhi, India
4. Principle of Genome Analysis & Genomics by Primrose and Twyman R.M. Blackwell Publishing
5. Principles of Genetics by Gardner et al John Wiley
6. Science of Genetics by Atherlay
7. Fundamentals of Genetics by B. D. Singh
8. Biotechniques: Theory and Practice by S. V. S. Rana, Rastogi Publishers
9. Principles and techniques of Biochemistry and Molecular Biology by Wilson and Walker