JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER

Programme: B.Sc. **Semester: V**

ZOOLOGY PAPER V
RESEARCH METHODOLOGY, GENETICS AND GENETIC ENGINEERING

Course Code:18VZO5 **No. of Hours: 45**

COURSE OBJECTIVES:

- The purpose of research is to discover the truth through the application of scientific procedures.
- To discover answers to questions or problems facing the society, industry or business
- To understand the basic concepts of Genes and gene activity.
- To provide practical skills in the basic aspects of histological procedures

LEARNING OUTCOMES:

- Give an introduction to research methods and report writing. Develop understanding on various kinds of research, research designs and sampling and have basic awareness of data analysis
- It also helps in obtaining the basic concepts of Genetics and technologies used to change the genetic makeup of cells, including the transfer of genes within and across species boundaries to produce improved or novel organisms
- Students acquire the knowledge on the application of Genetic Engineering in numerous fields including research, medicine, industrial biotechnology and agriculture.

UNIT I:

RESEARCH METHODOLOGY **09 HRS**

1. Introduction: meaning of research; objectives of research; types of research **1 HR** Descriptive, analytical, applied, fundamental, quantitative, qualitative, conceptual and Empirical**)**
2. Process involved in research: Formulation of research problem; literature survey; Development of working hypothesis; Preparing a research design; Determining sample size; Data collection; Analysis of data; Hypothesis testing; Generalization and interpretation; Conclusion(a brief outline of the above concepts) **2 HRS**
3. Literature survey; literature citation and Bibliography for thesis/dissertation/papers for a journal. **1 HR**
4. Data collection: primary and secondary data collection **1 HR**
5. Statistical Studies: Mean, Median, Mode and Standard Deviation (with problems)**3 HRS**
6. Techniques in Report writing for thesis/dissertation **1 HR**

GENETICS

UNIT II:

MENDELIAN GENETICS **09 HRS**

1. Heredity and Environment: Definition of genotype, phenotype, phenocopy, norm of reaction. **2 HRS**

2. A brief account of Mendel and his works. Mendel's laws Simple problems on Mendelism **2 HRS**

3. 3. Deviations from Mendelism. Incomplete dominance, Interaction of genes: Supplementary genes -
   Inheritance of comb shape in poultry.
   Epistasis (dominant). Multiple factor inheritance: Inheritance of skin color in man
   Multiple alleles: ABO and Rh blood groups - inheritance and their applications;
   Erythroblastosisfoetalis.Solving of problems **5 HRS**

UNIT III

CYTOGENETICS **08 HRS**

1. Sex Linkage: Haemophilia in man. Solving of problems (eye colour in *Drosophila*,colour blindness andhaemophilia). **2 HRS**
2. Linkage and crossing over **1 HR**
3. Chromosomal determination of sex: XX – XY, XX – XO and ZZ – ZW types. Genicbalance theory of Bridges.Gynandromorphsand Freemartins. **3 HRS**
4. Non-disjunction of sex chromosomes in man. Klinefelter's and Turner's syndrome. Autosomal anomalies – Down's syndrome, Cri-du-chat syndrome **2 HRS**

UNIT IV

MOLECULAR GENETICS AND HUMAN GENETICS **09 HRS**

1. Introduction to molecular Genetics **1 HR**
2. Fine structure of gene: Cistron, muton and recon. Gene regulation: Lac Operon **2 HRS** Genemutations: Spontaneous and induced mutations.CIB Method of detection of mutations,
3. Chemical mutagens. Effects of radiation **3 HRS**
4. Eugenics: Definition, positive and negative aspects; Euthenics and Euphenics **2 HRS**
5. Genetic Counselling **1 HR**

UNIT V

GENETIC ENGINEERING **10 HRS**

1. Genetic engineering: Introduction; Tools of rDNA technology: Endonucleases and DNA ligaseVectors: Plasmids and bacteriophage. Methods of gene transfer Gene Cloning/ Recombinant DNA technology;production of recombinant insulin. **5 HRS**
2. Applications of biotechnology: in crop improvement; transgenesis,gene therapy; stem cell therapy; DNA fingerprinting **4 HRS**
3. Polymerase Chain Reaction: technique and applications **1 HR**

RESEARCH METHODOLOGY, GENETICS AND GENETIC ENGINEERING
PRACTICAL – V

DURATION: 3 HRS/UNIT **NO. OF UNITS: 15**

RESEARCH METHODOLOGY AND BIOTECHNOLOGY

1.Problems on mean, median and mode **1 UNIT**

2. Problems on standard deviation **2 UNITS**

GENETICS and GENETIC ENGINEERING

3.Problem solving in Genetics **3 UNITS**

a) Monohybrid and Dihybrid inheritance

b) Sex linked inheritance

4. Studyof Blood groups in Man **1 UNIT**

5.*Drosophila*culture in the lab. **3 UNITS**

a. Male, Female identification

b. Mutant identification

c. Mounting of sex comb

d. Demonstration of preparation of Polytene chromosomes

6. Sex chromatin: Buccal smear preparation **1 UNIT**

7. Isolation of DNA from animal tissue **2 UNITS**

Practical tests/repetition **2 UNITS**

Note: 13 Practical + 2 units for practical tests/repetition

REFERENCES:

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2. **DEEPAK CHAWLA , NEENA SODHI** .2015 RESEARCH METHODOLOGY: CONCEPTS AND CASES, 2ND EDITION Vikas Publishing house
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5. **BHATNAGAR S.M.***et al.* 1999.ESSENTIALS OF HUMAN GENETICS, Orient Longman, 4th Ed.
6. **GARDENER E.J., SIMMONS M.J. AND SNUSTAD D.P.***et al*. 2005.PRINCIPLES OF GENETICS, John Wiley and Sons Inc., New York, 8th Ed.
7. **GLICK B.R. AND PASTERNAK J.J.** 1998. MOLECULAR BIOTECHNOLOGY, ASM Press, Washington, 2nd Ed.

8. **GUPTA P. K.** 2002. ELEMENTS OF BIOTECHNOLOGY, Rastogi Publications, Meerut.
9. **SINGH B.D.** 2002. BIOTECHNOLOGY, Kalyani Publishers, New Delhi.
10. **SINNOTT E.W., DUNN L.C. AND DOBZHANSKY T.** 1958. PRINCIPLES OF GENETICS, McGraw-Hill Publications, New York, 5th Ed.
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12. **STRICKBERGER M.W.** 1985.GENETICS, Pearson Prentice Hall, Low Price Edition, New Delhi.
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16. **WINCHESTER A.M.** 1969. GENETICS: A SURVEY OF THE PRINCIPLES OF HEREDITY, Oxford and IBH Publishing Co, New Delhi, 3rd Ed.