

**JYOTI NIVAS COLLEGE AUTONOMOUS
SYLLABUS FOR 2018 BATCH AND THEREAFTER**

Programme: B.Sc.

Semester: VI

**GENETICS PAPER VIII
APPLICATIVE GENETICS**

Course Code: 18VIGT8

No. of HRS: 45

COURSE OBJECTIVES:

- To understand the application of newer technologies in Genetics in the biological, medico-legal and agricultural fields
- To understand the role of genetics in germplasm conservation and plant and animal breeding
- To know the genetic control of tropical diseases.

LEARNING OUTCOMES:

- Students will gain knowledge on different methods used in DNA finger printing, pharmacogenetics and personalized medicine
- Have an understanding of genetic and biodiversity conservation
- Gain knowledge on hybridization and plant and animal breeding techniques Obtain knowledge on plant culture which can be used as an entrepreneurial activity

UNIT – I RECOMBINANT DNA TECHNOLOGY IN MEDICINE &

INDUSTRY

15 HRS

Production of recombinant insulin, interferon, human growth hormone, Antibiotics (penicillin), and vaccines (HPV).

Preparation of DNA probes, monoclonal antibodies and diagnostic kits. DNA chip technology

06 HRS

DNA Finger printing and Pharmacogenetics:

Methodology

01 HR

Molecular markers: RFLP, RAPD, VNTR, STR, Y-chromosome analysis, mitochondrial analysis

03 HRS

Application: Forensic science, medico-legal, wildlife and plant science

01 HR

Pharmacogenetics: Definition, introduction to pharmacogenetic concepts, gene loci influencing drug metabolism and pharmacogenetic interactions

03 HRS

Personalized medicine

01 HR

UNIT – II GENETIC RESOURCES AND BIODIVERSITY

06 HRS

Genetic resources: Germplasm classification, germplasm activities, organization associated with germplasm (NBPGR) **03 HRS**

Biodiversity: Genetic erosion, Centers of Diversity, Vavilovian Centers of Diversity; Law of parallelism, Gene sanctuaries, Gene bank **02 HRS**

Cryo-preservation **01 HR**

UNIT – III HETEROISIS AND GENETICS OF ANIMAL AND PLANT

BREEDING **11 HRS**

Definition, genetic concepts – dominance, overdominance Factors affecting heterosis; Manifestations of heterosis; Estimation of Heterosis - Types - Standard heterosis, average heterosis and heterobeltiosis Inbreeding- Effects, inbreeding depression. **03 HRS**

Animal breeding:

Introduction to animal breeding – Definition, objectives, systems of breeding: inbreeding, cross breeding (intergeneric, interspecific and intraspecific), outbreeding, grading **01 HR**

Modern techniques used in animal breeding – selection of parent, artificial insemination, super ovulation and embryo transfer Cross breeding in cattle - exotic Holstein Friesian (HF) with local AmritMahal and Hallikar breeds. Crossing non-descriptive cattle breeds (eg. MalnadGidda) with exotic Jersey and HFPoultry breeds – Girirani, Swarnadhara, Kadaknath hybrids. **03 HRS**

Plant Breeding:

Definition, Aims and Objectives Major impacts of plant breeding –Examples of hybrid vigor exploitation in rice, cotton and maize Procedure of Hybridization Methods of

hybridization **04 HRS**

UNIT – IV INTRODUCTION TO PLANT AND ANIMAL TISSUE

CULTURE **09 HRS**

Embryo, anther and ovary cultures. **03 HRS**

Shoot and root meristem cultures. **02 HRS**

Callus culture from undifferentiated cell, protoplast culture. **02 HRS**

Introduction to Animal tissue culture **02 HRS**

UNIT – V GENETICS OF TROPICAL DISEASES **04 HRS**

Biological control – Gambusia and Bacillus thuringensis against mosquito larvae and genetic basis of insecticide resistance **03 HRS**

Genetic control through reciprocal translocation. **01 HR**

III B. Sc. GENETICS
VI SEMESTER PRACTICAL VIII

DURATION 3 HRS/UNIT

NO. OF UNITS: 15

1. Observation of malarial parasites.	1 UNIT
2. Tissue culturing Preparation of nutrient medium Culturing of node, internode, and leaf Preparation of synthetic seeds Pollen fertility	6 UNITS
3. Study of Hybrid plants Techniques in plant hybridization	1 UNITS
4. Study of Hybrid animals Dairy, poultry and piggery	3 UNITS
5. Primer designing Practical tests/repetition	2 UNITS 2 UNITS

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

REFERENCES:

1. AGT CYTOGENETICS LABORATORY MANUAL, Barch M. (Ed) (1997), Lippincott.
2. CELL AND MOLECULAR BIOLOGY, Gupta P.K. (2003), Rastogi Publications, Meerut.
3. CELL BIOLOGY, Powar C.B., Himalaya Publishers, New Delhi.
4. ELEMENTS OF PLANT BREEDING, Phundan Singh (2001), 2nd edition, Kalyani Publishers, New Delhi.
5. ESSENTIALS OF HUMAN GENETICS, Bhatnagar S.M. et al (1999), 4th edition, Orient Longman.
6. FUNDAMENTALS OF GENETICS, Singh B.D, (1995), Revised edition, Kalyani Publishers, New Delhi.
7. GENETICS, Gupta P.K. (2001), 3rd edition, Rastogi Publications, Meerut.
8. GENETICS, PRINCIPLES AND ANALYSIS, Daniel Hartl & Jones E.W, (1998), 4th edition, Jones and Bartlett Publication.
9. GENETICS, Strickberger M.W., (1985), 3rd edition, Prentice Hall of India.
10. GENETICS: FROM GENES TO GENOMES, Hartwell L.H. et al (2004), 2nd edition, McGraw-Hill, New York.
11. INTRODUCTION TO GENETIC ENGINEERING, Desmond, S.T.Nicholl (2002), 2nd edition, Cambridge University Press.
12. LABORATORY MANUAL OF GENETICS Winchester A.M.&Wejksnora P.J., (1996), 4th edition, McGraw-Hill, New York.
13. MOLECULAR BIOTECHNOLOGY, Glick B.R and Pasternak J.J., (1998), 2nd edition, ASM Press, Washington.
14. PRINCIPLES OF GENETICS, Gardener et al, (1991), 3rd edition, John Wiley & Sons Publications, New York.
15. PRINCIPLES OF GENETICS, Sinnott E.W., Dunn L.C. and Dobzhansky T. (1958), 5th edition, McGraw-Hill Publications, New York.
16. PRINCIPLES OF GENETICS, Tamarin R.H., (2002), 7th edition, Tata McGraw Hill, New Delhi.
17. THEORY AND PROBLEMS OF GENETICS, Stansfield W.D. (Schaums outline Series) (2002), Tata McGraw-Hill, New Delhi.