

Course: Discipline Specific Elective

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| Semester | 6 |
| Paper Number | HMBDS6032T |
| Paper Title | Inheritance Biology |
| No. of Credits | 6 (Th:4, Pr:2) |
| Theory/Composite | Composite |
| No. of periods assigned | Th: 4 Pr: 3 |
| Course description/objective | <ol style="list-style-type: none">1. To understand the basics of inheritance, classical as well as modern and their implications in different organisms.2. To study different aspects of chromosome, their recombination and transposition3. To study basics of human genetics |
| Reading/Reference Lists | <ol style="list-style-type: none">1. Gardner EJ, Simmons MJ, Snustad DP (2008). Principles of Genetics. 8th Ed. Wiley-India2. Snustad DP, Simmons MJ (2011). Principles of Genetics. 6th Ed. John Wiley and Sons Inc.3. Weaver RF, Hedrick PW (1997). Genetics. 3rd Ed. McGraw-Hill Education4. Klug WS, Cummings MR, Spencer CA, Palladino M (2012). Concepts of Genetics. 10th Ed. Benjamin Cummings5. Griffith AJF, Wessler SR, Lewontin RC, Carroll SB. (2007). Introduction to Genetic Analysis. 9th Ed. W.H.Freeman and Co., New York6. Hartl DL, Jones EW (2009). Genetics: Analysis of Genes and Genomes. 7th Ed, Jones and Bartlett Publishers7. Russell PJ. (2009). <i>i</i> Genetics - A Molecular Approach. 3rd Ed, Benjamin Cummings |
| Evaluation | CIA: 20 End-Sem:80 (Th:50 and Pr:30) Question paper format of Th paper (Mod 1 & 2: 25 Marks each) For each module: Objective questions 5 marks (5 questions out of 7) 2 questions of 10 marks each (2 questions out of 3) |

INHERITANCE BIOLOGY (THEORY)
SEMESTER –VI

HMBDS6032T

TOTAL HOURS: 52

CREDITS: 4

Module 1

Marks 25

Unit 1 Mendelian Principles

No. of Hours: 6

Mendel's Laws: Dominance, segregation, independent assortment, deviation from Mendelian inheritance, Rediscovery of Mendel's principles, Chromosome theory of inheritance: Allele, multiple alleles, pseudoallele, complementation tests, patterns of inheritance, Extensions of Mendelian genetics: Allelic interactions, concept of dominance, recessiveness, Incomplete dominance and co-dominance, Epistasis, suppressors, synthetic lethal, penetrance and expressivity

Unit 2 Linkage and Crossing over

No. of Hours: 6

Linkage and recombination of genes, Cytological basis of crossing over, Crossing over at four-strand stage, Molecular mechanism of crossing over, mapping with examples

Unit 3 Extra-Chromosomal Inheritance

No. of Hours: 6

Rules of extra nuclear inheritance, Organelle heredity - Chloroplast mutations in *Chlamydomonas*, chloroplast inheritance in *Mirabilis iglana*, Maternal effects – Shell coiling in *Limnaea peregra*. Infectious heredity - Kappa particles in *Paramecium*

Unit 4 Characteristics of Chromosomes

No. of Hours: 8

Structural organization of chromosomes - centromeres, telomeres and repetitive DNA, Packaging DNA molecules into chromosomes, Concept of euchromatin and heterochromatin, Normal and abnormal karyotypes of human chromosomes, Chromosome banding, Giant chromosomes: Polytene and lampbrush chromosomes

Module 2

Marks 25

Unit 5 Structural variation

No. of Hours: 8

Variations in chromosome structure: Deletion, duplication, inversion reciprocal translocation, Variation in chromosomal number and structural abnormalities in human, Klinefelter syndrome, Turner syndrome, Down syndrome

Unit 6 Recombination**No. of Hours: 6**

Homologous and non-homologous recombination, eukaryotic transposition

Unit 7 Human genetics**No. of Hours: 6**

Pedigree analysis, lod score for linkage testing,

Unit 8 Quantitative genetics**No. of Hours: 6**

Polygenic inheritance, heritability and its measurements,

INHERITANCE BIOLOGY**(PRACTICAL)****HMBDS6032P****TOTAL HOURS: 39****CREDITS: 2**

1. Studying Barr Body with the temporary mount of human cheek cells
2. Karyotyping with the help of mitotic chromosomes from root tip.
3. Variation of chromosome structure after mutagenesis.
6. Study of polytene chromosomes using temporary mounts of salivary glands of *Drosophila* larvae
7. Identifying different chromosomes using fly genetics
8. Study of meiotic chromosomes
10. Study of banding pattern using Giemsa and other dyes.