SECTION – I
(Course Content)

GENETICS

(Handouts/ monographs – to be prepared and distributed to the students)

Lecture: 8 hrs

Practicals: 6 hrs

TOPICS

1. Introduction : 1 hr

A. Definition:
   a. Medical genetics
   b. Cytogenetics
   c. Clinical genetics

B. History:
   a. Gregor Mendel
   b. Mendelian laws of inheritance
   c. Mitosis
   d. Meiosis

2. Chromosomes: 1 hr

a. Structure
b. Classification of human chromosomes
c. Karyotyping- methodology
d. Sex chromatin
e. Lyon hypothesis

3. Chromosomal disorders:

- Importance of non-disjunction
- Numerical abnormalities
  - Polyploidy
  - Aneuploidy
  - Trisomy and monosomy
  - Down's syndrome
  - Patau's syndrome
  - Edwards's syndrome
  - Klienfelter's syndrome
  - Turner's syndrome
  - Mosaicism
  - Causes of numerical abnormalities

- Structural abnormalities
  - Deletion, inversion, translocation and ring chromosomes
  - Isochromosomes, chromosomal fragile sites, fragile X chromosome

4. Chromosome at molecular level: 1 hr

- Structure of DNA- RNA
- Genetic code
- Genetic mutation
- Mutagens

5. Clinical genetics 1 hr

- Pedigree chart
- Inheritance

6**. Diagnosis of Genetic disease** 1 hr

- Prenatal diagnosis
  - Indications
  - Chorionic villi biopsy
  - Maternal sera
  - Amniocentesis

7. **Genetic Counselling :** 1 hr

a. Definition
b. Indication
c. Basis of gene therapy

8. Revision : 1 hr

SECTION – II
(Course Content under Level – I, II, III)

GENETICS

(Handouts/ Monographs to be prepared and distributed to the students)

S.NO	TOPIC	LEVEL 1	LEVEL 2	LEVEL 3	PRACTICALS	DEMONSTRATION
1	**INTRODUCTION**	*Definition:* • Medical genetics • Clinical genetics *History* • Gregor Mendel • Mendelian laws of inheritance			• Draw the different stagers of mitosis • Draw the X-chromatin (Barr body)	• Demostration of mitosis and meiosis under the microscope • Demonstration of Barr body under the microscope

		Cell division: • Mitosis • Meiosis				
2	**CHROMOSOME - I**	• Structure of chromosome • Classification of human chromosomes • Sex chromatin • Lyon hypothesis • Karyotyping: Methodology			• Prepare a karyotype from the given photocopy of numbered G-banded chromosomal spread	Demosnstration of normal male and female chromosome spreads focused under the microscope
3	**CHROMOSOME - II**	• Structure of DNA, RNA • Genetic code • Gene mutation • Mutagens				• Demonstration of DNA using a model

4	**GENETIC DISEASES- I**	**1. SINGLE GENE DISORDERS:** • Autosomal dominant • Autosomal recessive • Sex linked dominant • Sex linked recessive **2. CHROMOSOMAL DISORDERS:** **a. Numerical abnormalities:** ➢ Polyploidy ➢ Aneuploidy (Trisomy & monosomy) ➢ Down's syndrome ➢ Patau's syndrome ➢ Edrward's syndrome ➢ Klienfelter's syndrome ➢ Turner's syndrome **b. Mosaicism** **c. Causes of numerical abnormalities** **d. Non-disjunction** **e. Anaphase lag** **f. Structural abnormailities:** ➢ Deletion, inversion, translocation, ring	➢ Cri-du chat syndrome ➢ Fragile X-chromosome			• Clinical cases or pictures of the clinical cases

		chromosome ➢ Isochromosome, fragile sites **3. MULTIFACTORIAL DISORDERS**				
6	**CLINICAL GENETICS**	• Pedigree chart/ symbols				
7	**DIAGNOSIS OF GENETIC DISEASES**	**Prenatal diagnosis:** • Indications • Amniocentesis • Chorionic villus biopsy • Maternal serum screening				• Demonstration (live or video) of the techniques
8	**GENETIC COUNSELLING AND NEW DEVELOPMENTS**	• Definition • Indications • Gene therapy • Human genome • Human cloning				

GENETICS : PRACTICALS
(Each of two hours duration*)

1. Mitosis, meiosis, Barr body :
    - Stages of mitosis, meiosis are focused under the microscope
    - To draw the different stages of mitosis and meiosis
    - To draw the Barr body which is focused under the microscope

2. Preparing a pedigree chart :
    - Symbols used for preparing a pedigree chart are provided
    - To make a pedigree considering the student as a proband

3. Karyotyping and clinical features of common genetic syndromes :
    - To prepare a karyotype from the photocopy of the numbered G banded chromosomes
    - Normal male and female chromosomal spreads are focused under the microscope for demonstration
    - Observation and writing of the clinical features of Down's syndrome. Patua's syndrom Edward's syndrome. Klinfelter's syndrome and Turner's syndrome shown in photographs.

*** Workbook also to be completed**