

Nayagarh autonomous college, Nayagarh

CC--VII: Genetics

Unit-1(a)

1. Answer the following questions:(1×8)

- (1) Who is regarded as father of genetics?
- (2) How many pairs of contrasting characters of pea plant were studied by Mendel?
- (3) The operation of removal of anther is called-----
- (4) The external appearance of organism is called-----
- (5) The genetic constituent of an organism is called -----
- (6) Father of experimental genetics is_____.
- (7) The genes were located on chromosome were proved by-----
- (8) Chromosome theory of inheritance was put forward by -----
- (9) Chromosomes are vehicles of heredity stated by-----
- (10) The term factor was used by-----
- (11) Mendel's work was published in a paper entitled-----
- (12) Evidence for cytoplasmic inheritance was presented by-----
- (13) Genes has two alternative forms are called -----
- (14) The sum total of genes present in the reproductive individual of a population constitute its -----

2. Answer in two or three sentences [1.5 mark each]

- | | |
|-------------------------|---------------------|
| a. Autosome | i. Pure line |
| b. Back cross | j. Phenotype |
| c. Test cross | k. Genotype |
| d. Sex chromosome | l. Homozygous |
| e. Allele | m. Heterozygous |
| f. Incomplete dominance | n. Monohybrid cross |
| g. Gene | o. Dihybrid cross |
| h. Locus | |

3. Answer in 75 words

1 Incomplete dominance

[2 marks each]

8 Genic balance theory

- 2 Co-dominance
- 3 Epistasis
- 4 Dominant epistasis
- 5 Recessive epistasis
- 6 Multiple alleles
- 7 Pleiotropy

- 9 Complementary genes
- 10 Supplementary genes
- 11 Chloroplast mutation
- 12 Variegation in 4O clock plant
- 13 Mitochondrial mutation in yeast
- 14 Reason behind Mendel's success

4. Answer the following in 500 words [6 mark each]

- 1 Describe the history and principle of inheritance?
- 2 State and explain monohybrid cross?
- 3 How dihybrid cross explain the law of independent assortment?
- 4 Explain incomplete dominance and co-dominance with examples?
- 5 What is lethal allele explain?
- 6 Explain sexlinked inheritance in man giving example of colourblindness and haemophilia?
- 7 Explain extrachromosomal inheritance by giving suitable examples?

Unit-1(b)

1. Answer the following questions: (1 x 8 = 8)

- i) The genetic information passed on through extranuclear inheritance is present in -----
----- of cell.
- ii) ----- and ----- among cellular organelles contain their own DNA.
- iii) Cytoplasmic inheritance was first reported by ----- in yeast.
- iv) Extra chromosomal DNA do not follow ----- pattern of inheritance.
- v) Maternal inheritance is observed in ----- cells.
- vi) Plastid DNA inheritance was first reported by ----- in -----

plant.

vii)The maternal inheritance of male sterility in maize was first reported by -----
-----.

viii)Shell coiling due to the maternal effect was seen in the snail-----.

Group-B

2. Answer the following questions: (1.5x 8)

i) Write the synonyms for extrachromosomal inheritance.

ii) The genes present in the cytoplasm are called what?

iii) What is maternal effect?

iv) What are kappa particles?

v) What are killer strains in Paramecium?

vi) What is variegation in plants?

vii)What are petite yeasts?

viii)What is cytoplasmic male sterility?

Group-C

3. Answer the following questions: (2x 8)

i) What are the characteristics of cytoplasmic inheritance?

ii) Describe the shell coiling in snail?

iii) Describe kappa particle transmission in Paramecium aurelia?

iv) How the petite yeast strains are different than the normal yeast strains?

v) What segregational petites?

vi) What are neutral petites?

vii) What are the 3 distinct cytoplasmic male sterile cytoplasms known in maize?

viii)Describe the role of cytoplasmic male sterility in crop improvement?

Group-D

4. Answer the following questions: (6x4= 24)

- i) Discuss in the plastid inheritance in *Mirabilis jalapa*?
- ii) Discuss the mitochondrial inheritance in yeast?
- iii) Discuss cytoplasmic male sterility in plants?
- iv) Discuss in brief the cytoplasmic male sterility?

Unit--2

1. Answer the following questions: (1x8)

- (1) This phenomenon of inheritance of genes together and to retain their parental combination in offspring known as _____.
- (2) The chromosome theory of linkage formulated by _____.
- (3) Number of linkage group in *Pisum sativum* is _____.
- (4) _____ is unit of crossing over.
- (5) Crossing over occurs in the _____.
- (6) The phenomenon of linkage was first observed in plant _____.
- (7) Repulsion and coupling are 2 faces of _____.
- (8) The interference is inversely proportional to the percentage of _____.

2. Answer the following questions: (1.5x8)

- (1) In a linear chromosome map distance between 4 loci is as follows a-b=10%, a-d=3%, b-c=4%, a-c=6% .The cross over frequency between c and d is ?
- (2) IF the % of crossing over between two genes is 10, What will be distance between two genes?
- (3) What is coincidence?
- (4) What is map unit distance?
- (5) write notes on Single and double cross over
- (6) What is number of linkage groups of maize?

- (7) What is crossing over?
- (8) Write note on arrangement of linked genes?

3. Answer the following questions:(2×8)

- (1) Write note on complete linkage?
- (2) What are characteristics of chromosomes theory of linkage?
- (3) Theories explaining mechanism of Crossing over?
- (4) Define Coincidence?
- (5) Define Interference?
- (6) Describe Different kinds of crossing over?
- (7) Define Coupling and Repulsion hypothesis?
- (8) Which factors control frequency of crossing over?

4. Answer the following questions:(6×4)

- (1) Describe the process of linkage and it's significance?
- (2) Describe the process of crossing over and mention it's utility?
- (3) Discuss the experiment conducted by stern to demonstrate the cytological basis of heredity?
- (4) An individual heterozygous for three genes, AaBbCc are test crissed to AaBbCc and 1000 progenies are classified by the gametic contribution of heterozygous parent as follows:

ABc-305, abC-310, aBC-42, Abc-43, ABC-140, abc-145, aBc-6, AbC-9

Draw a linkage map of the linked genes, showing the order and distance in cM.

Unit-3

1. Answer the following questions:(1×8)

- 1(a) individuals having one chromosome extra to diploid genome are called _____.

- (b) Aneuploidy is the _____ of one or more chromosome to the complement of an angiosperm.
- (c) *Raphanus sativa* contains _____ no. of chromosome .
- (d) Nullisomy is represented by _____.
- (e) Tobacco is a _____ ploid species .
- (f) Replacement of one purine in to another pyrimidine is known as _____.
- (g) 5-BC .is a structural analog of _____
- (h) _____ is a non-ionising radiation.

2) Answer with in two sentence (1.5×8)

- (a) Give two example and effect of ionising radiations?
- (b) What is mutagens, explain with examples?
- (c) Write two types of somatic mutation?
- (d) Write two types of acameshit mutation
- (e) What is back mutation?
- (f) What is inversion?
- (g) Write the significance of translocation?
- (h) What is duplication?

(3) Answer with in 75 words (2×8=16)

- (a) Write note on allopolyploids?
- (b) Write notes on trisomics in man?
- (c) Write notes on deletion?
- (d) What is tautomerization?
- (e) What is ionization?

(f)What are base analogues?

(g)write notes on chemical mutagens ?

(h)Write notes on transversions ?

4) Answer with in 500 words. (4×6=24)

(a) What are frame-shift mutations? What are their effects?

(b) Discuss in brief the most important role played by chromosomal aberration?

(c) Differentiate between autoployploids and allopolyploids?

Unit-4

1.Fill in the blanks ;(1X8=8)

a. The study of the frequencies of genes and genotypes in a mendelian population is known as _____.

b. when each individual of one sex has equal chance of mating with every individual of opposite sex called _____ mating.

c. The sum of total genes in a mendelian population called _____.

d. The proportion of different alleles of a gene in a random mating population called _____.

e. The foundation of population genetics was laid by G.H Hardy and _____.

f. A sudden heritage change in the characteristics of an organism is called _____.

g. The differential rates of reproduction of different genotypes in a population called _____.

h. Genetic drift is the random change in gene frequencies due to _____.

Q.2 Write short notes in 1- 2 sentences (1.5 X 8)

a. Gene frequencies b. Random mating c. Gene pool d. Fitness

e. significance of population genetics f. Sampling g. Mendelian population

h. Migration

Q.3 Write the following in 75 words : (2x8)

a. Factors affecting gene frequency

b. Selection coefficient c. Mutation d. Allele frequency

e. Founder effect f. Zygote selection g. Evolutionary factors h.
Recurrent mutation

4 Answer the following questions in 500 words (6X4)

(1) Define Hardy-Weinberg law.

Describe briefly the basic assumptions on which this law is based .

(2) Define gene frequency . Briefly describe the procedure for estimation of gene frequency in a given population .

(3) Define population genetics . Who developed the branch of genetics . Describe its significance in plant breeding?

(4) Differentiate between

a. Selection coefficient and selection differential

b. Gene frequency and genotype frequency

c. Genetic drift and founder effects