P. P. SAVANI UNIVERSITY

Third Semester of B.Sc. Examination
December-2021
SSBT2010–Genetics-I

07.12.2021, Tuesday **Time: 09:00 a.m. to 11:30 a.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

Section-I (Total Marks - 30)

Q.1 Short Questions **[10]**

1.1 Objectives **[05]**

1.1a After cross-fertilization of true-breeding tall and dwarf plants, the F1 generation was self-fertilized. The resultant plants have genotype in the ratio

A 1:2:1 (homozygous tall: heterozygous tall: dwarf)
B 3:1 (tall: dwarf)
C 1:2:1 (heterozygous tall: homozygous tall: dwarf)
D 3:1 (dwarf: tall)

1.1b If gene frequency between gene a and c is 2%; b and c is 13%; b and d 4%; a and b 15%; c and d 17 and a and d 19%. The sequence of genes in a chromosome is _____.

A a, d, b, c
B a, c, b, d
C a, b, c, d
D d, b, a, c

1.1c Which of the following is a test cross?

A Hh x HH
B HH x HH
C Hh x hh
D Hh x Hh

1.1d The number of types of gametes produced by a homozygous individual is __.

A 1
B 2
C 3
D Many

1.1e Which of Mendel's laws will be violated by linkage?

A Law of purity of gametes
B Law of independent assortment
C Law of dominance
D Law of segregation

1.1f Linkage _____ as the distance between two genes _____.

A Decreases, Decreases
B Increases, Increases

C Unaffected, Decreases
D Increases, Decreases

1.1g Blue eye colour is recessive to brown eye colour. A brown eyed man whose mother was blue eyed marries a blue-eyed woman. The children will be ___
A Both blue eyed and brown eyed 3: 1
B All brown eyed
C All blue eyed
D Blue eyed and brown eyed 1:1

1.1h Genetic traits of seeds are noted as follows: L = long, l = short, W = wrinkled, w = smooth, Y = yellow, y = white, R = ribbed, r = grooved. Which of the following is the genotype for a short, wrinkled, yellow, grooved seed?
A llWwyyrr
B LLWWyYRr
C LlWwYYRr
D llWwYYrr

1.1i The scientists who have given the theory of linkage are
A Morgan and Castle
B Beadle and Tatum
C Watson and Crick
D. Bateson and Punett

1.1j According to mendelism which character shows dominance?
A Terminal position of flower
B Green colour in seed coat
C Green pod colour
D Wrinkled seeds

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a The number of types of gametes in genetic cross is determined by ____.

1.2b Who rediscovered the Mendel's principles?

1.2c The tendency of linkage is directly proportional to the rate of crossing over between two genes. TRUE/FALSE

1.2d ABO blood group is not an example of multiple allelism. TRUE/FALSE

1.2e The maximum crossing over frequency is ____.

Q.2 Short Notes (Attempt any two) **[06]**

A Write Laws of inheritance.
B Why Mendel choose pea plant for hybridization experiment?
C Give difference between crossing over & linkage.

Q.3 Explain in detail (Attempt any two) **[14]**

A What is linkage? Explain its types.
B Explain: Mendel's monohybrid cross with laws.
C Write a note on genetic mapping.

Section-II (Total Marks - 30)

Q.1 Short Questions [10]

1.1 Objectives [05]

1.1a Euploidy is the chromosomal variation in ___.

- **A** Size of chromosomes
- **B** Position of genes
- **C** Number of chromosomes
- **D** Structure of chromosomes

1.1b How will you recognize a terminal deletion from breakage and loss at the terminal end?

- **A** Indistinguishable
- **B** Terminal break will lead to shorter chromosome than that due to chunk deletion
- **C** Terminal break will be sticky
- **D** Deletion will be recognized by trans factors

1.1c Which of the following is an example of trisomy?

- **A** Endosperm
- **B** Klinefelter
- **C** Turner
- **D** Xeroderma

1.1d Which of the following represents Turner syndrome?

- **A** 45, X
- **B** 47, XXX
- **C** 47, XXY
- **D** 45, Y

1.1e In pericentric inversion, the inversion loop involves _____ strands.

- **A** 1
- **B** 2
- **C** 3
- **D** 4

1.1f If an organism has 16 chromosomes, the number of chromosomes generated by nullisomy will be _____.

- **A** 15
- **B** 7
- **C** 14
- **D** 16

1.1g Consider this sequence A-X-B-C-D-E-F, be a DNA sequence where X is the centromere. Which of the following will be a paracentric inversion?

- **A** A-X-B-C-F-E-D
- **B** C-B-X-A-D-E-F
- **C** A-X-B-C-D-E-F
- **D** E-D-C-B-X-A-F

1.1h The number of chromosomes in a basic set is known as ____.

- **A** Haploid

B Euploid
C Aneuploid
D Monoploid

1.1i Which of the following is exception for the types of duplication mutation?
A Tandem duplication
B Intercalary duplication
C Displaced duplication
D Transposed duplication

1.1j 2n-1-1 is a ___
A Monosomy
B Disomy
C Nullisomy
D Double monosomy

1.2 Answer the Following: (MCQ/Short Question/Fill in the Blanks) **[05]**

1.2a Euploidy is a form of allopolyploidy. TRUE/FALSE

1.2b The appearance of a recessive phenotype due to deletion of dominant gene is called_____.

1.2c Deletion mutation in chromosome can be revert back to normal condition. TRUE/FALSE.

1.2d _____ are polyploids in with chromosomes derived from a single species.

1.2e Colchicine interferes in the development of _____.

Q.2 Short Notes (Attempt any two) **[06]**

A What is duplication mutation? Write its types.

B What is monosomy? Explain in detail about hypo ploidy

C Explain: Variation in chromosome morphology.

Q.3 Explain in detail (Attempt any two) **[14]**

A Write a note on polyploidy

B Explain in detail about mutation in which non-homologous chromosomes exchange their parts.

C Explain: Inversion mutation.