# P. P. SAVANI UNIVERSITY

**Third Semester of B.Sc. Examination**
**December-2021**
**SSMB2070–Microbial 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.