

# QUESTION BANK

## ST. XAVIER'S COLLEGE, MAHUADANR

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### SEMESTER III CORE COURSE- C 7 (GENETICS)

#### Multiple Choice Questions:

- Genetics is the study of
  - Resemblances amongst individuals
  - Heredity and environment
  - Differences amongst individuals
  - Heredity and variation**
- Who called the father of genetics
  - T. H. Morgan
  - Bateson
  - Gregor Jhonn Mendel**
  - Carl Correns
- What is the ratio for a typical dihybrid cross
  - 9:3:3:1**
  - 1:1:1:1
  - 6:7:2:1
  - 5:2:4:1
- What is the ratio for a typical monohybrid cross
  - 1:2:1
  - 3:1**
  - 1:1:1:1
  - 9:7
- Pea plant were used in Mendel's experiments because
  - They were cheap
  - They had contrasting characters
  - They were available easily
  - All of the above**
- When homozygous tall plant is crossed with homozygous dwarf plant, all the F<sub>1</sub> plant produced were
  - Homozygous tall
  - Heterozygous tall**
  - Homozygous dwarf
  - Heterozygous dwarf

7. Mendel's law of segregation was formulated on the basis of
- Monohybrid cross**
  - Dihybrid cross
  - Back cross
  - Test cross
8. Mendel's law of independent assortment was formulated on the basis of
- Monohybrid cross
  - Out cross
  - Dihybrid cross**
  - Test cross
9. Which of the following are dominant characters according to Mendel?
- Green coloured pod and rounded seed**
  - Terminal fruit and wrinkled seed
  - White testa and yellow pericarp
  - Dwarf plant and yellow fruit
10. A cross of  $F_1$  individual with either of the two parent is known as
- Back cross**
  - Test cross
  - Reciprocal cross
  - Reverse cross
11. A cross of  $F_1$  individual with only dominant parent is known as
- Back cross
  - Test cross
  - Out cross**
  - Reverse cross
12. What is the ratio for a polygenic inheritance, when it is consisting of two genes
- 9:3:3:1
  - 1:6:15:20:15:6:1
  - 1:4:6:4:1**
  - 3:4:5:6
13. Among the following characters, which one was not considered by Mendel in his experiments on pea?
- Trichomes- glandular or non-glandular**
  - Seed- green or yellow
  - Pod- inflated or constricted
  - Stem- tall or dwarf
14. What is the other name for incomplete dominance
- Blending inheritance
  - Co-dominance
  - Pseudo-dominance

- d. All of the above**
15. What is the ratio of dominant epistasis
- 9:3:4
  - 9:7
  - 12:3:1**
  - 9:3:3:1
16. Mendel proposed that every character is controlled by
- One factor
  - Two factor**
  - One chromosomes
  - Two chromosomes
17. The back cross of  $F_1$  hybrid with the recessive parent is called
- Test cross**
  - Reciprocal cross
  - Monohybrid cross
  - Punnett square cross
18. Incomplete dominance is found in
- Pisum sativum* (pea plant)
  - Antirrhinum majus* (snapdragon plant)**
  - Both of these
  - None of these
19. Phenomenon in which a single gene influences more than one trait is called
- Penetrance
  - Polyploidy
  - Polydactyl
  - Pleiotropy**
20. The gene which suppresses and masks the expression of other is
- Recessive
  - Epistatic**
  - Codominant
  - Complementary
21. Choose the correct statement
- 'O' blood group is universal acceptor
  - 'A' blood group is universal donor
  - 'B' blood group is universal acceptor
  - 'O' blood group is universal donor**
22. ABO blood group in humans is controlled by the gene I. It has three allele-  $I^A$ ,  $I^B$  &  $I^O$ . Since there are three different allele, six different genotypes are possible. How many phenotypes can occur?
- 3

- b. 4
  - c. 1
  - d. 2
23. Extranuclear inheritance commonly occurs in
- a. Nucleus
  - b. **Cytoplasmic organelles**
  - c. Ribosomes
  - d. Cell membrane
24. The transmission of genes that occur outside the nucleus is called
- a. Extranuclear inheritance
  - b. Cytoplasmic inheritance
  - c. **Both A and B**
  - d. None of the above
25. Mitochondrial diseases are received from
- a. **Mother**
  - b. Father
  - c. In laws
  - d. Environment
26. The two organelles responsible for cytoplasmic inheritance among eukaryotes are
- a. Lysosomes and mitochondria
  - b. Mitochondria and Golgi complex
  - c. **Chloroplasts and mitochondria**
  - d. Chloroplasts and lysosomes
27. Alleles are
- a. **Alternate forms of genes**
  - b. Linked genes
  - c. Chromosomes that have crossed over
  - d. Homologous chromosomes
28. Pedigree charts are used to identify
- a. Genetic drift
  - b. Genetic diversity
  - c. **Genetic diseases**
  - d. Genetic mutation
29. In 1900, three biologists independently rediscovered Mendel's principles. They were
- a. Sutton, Morgan and Bridges
  - b. Bateson, Punnett and Bridges
  - c. Avery, MacLeod and McCarty

**d. Hugo de Vries, Carl Correns and Tschermak**

30. In monohybrid cross, the genotypic ratio of F<sub>2</sub> is
- 3:1
  - 1:2:1**
  - 4:0
  - 1:1:1:1
31. ABO blood group system exhibits
- Epistasis
  - Multiple allelism**
  - Incomplete dominance
  - Multiple factor inheritance
32. Who discovered cytoplasmic inheritance
- T.H. Morgan
  - Carl Correns**
  - Jhonn Mendel
  - Hugo de Vries
33. Cytoplasmic inheritance is also known as
- Mendelian inheritance
  - Extra-chromosomal inheritance**
  - Polygenetic inheritance
  - Nuclear inheritance
34. Kappa particles indicate
- Nuclear inheritance
  - Cytoplasmic inheritance**
  - Mutation
  - Nucleo-cytoplasmic inheritance
35. Common name of *Mirabilis jalapa*
- Snapdragon plant
  - Pea plant
  - 4 o'clock plant**
  - None of these
36. A gamete normally contain
- All allels of gene
  - Many allele of gene
  - One allele of gene**
  - Two allele of gene
37. Mutation can be induced by
- IAA
  - Ethylene
  - Gamma radiation**
  - Infrared radiation

38. Change in the sequence of nucleotide in DNA is called
- Mutagen
  - Mutation**
  - Translocation
  - Recombination
39. Klinefelter's syndrome is
- XO
  - XXY**
  - XXX
  - XXXY
40. When we cross red flowered variety of *Mirabilis jalapa* (4 O'clock plant) with white flowered variety, we get pink flowers. This is called
- Complete dominance
  - Co-dominance
  - Incomplete dominance**
  - Epistasis
41. Who discovered linkage
- T.H.Morgan**
  - Tschmark
  - Correns
  - Punnett
42. Complete linkage is observed in
- Male drosophila**
  - Female drosophila
  - Birds
  - Maize
43. Incomplete linkage is observed in
- Female drosophila
  - Maize
  - Both A and B**
  - None
44. Genetic drift operates in
- Non-reproductive population
  - Slow reproductive population
  - Small population**
  - Large population
45. In Hardy Weinberg equation, the frequency of heterozygous individual is represented by

- a.  $pq$
- b.  $q^2$
- c.  $p^2$
- d.  $2pq$**

46. Which of the following equation is given by Weinberg

- a.  $2pq + p^2 + q^2 = 1$
- b.  $P^2 + p^2 + pq = 1$
- c.  $P^2 + 2pq + q^2 = 1$**
- d. None of these

47. The phenomenon in which genes are present on the same chromosomes is

- a. Cross over
- b. Segregation
- c. Linkage**
- d. assortment

48. what is the unit of recombination frequency

- a. Mu
- b. CM
- c. %
- d. All of the above**

49. Accurate mapping of genes can be done using

- a. Two point mapping
- b. Three point mapping**
- c. Single gene mapping
- d. None of the above

50. The linkage groups in man are

- a. 46
- b. 23**
- c. 22
- d. 24

51. Gene A and B are linked gene. Which of following gametes show recombination

- a. AB**
- b. ab
- c. Ab
- d. Ab

52. Mendel did not observe linkage due to

- a. Mutation
- b. Synapsis
- c. Crossing over

- d. **Independent assortment**
53. The phenomenon of linkage was first observed in the plant
- Lathyrus odoratus**
  - Pisum sativum
  - Datura
  - d. Mirabilis jalapa
54. What is the scientific name of pea
- Pisum sativum***
  - Lathyrus odoratus*
  - Cicer arhentinum*
  - d. *Zea mays*
55. What is the haploid number of chromosome of pea
- 4
  - 5
  - 6
  - 7**
56. Crossing over occurs during
- Pachytene**
  - Diplojene
  - Diakinesis
  - Leptotene
57. Crossing over is more frequent in
- Males
  - Females**
  - Both
  - d. None of these
58. The scientific name of fruitfly is
- Mirabilis jalapa
  - Cicer gigas
  - Cicer arientinum
  - Drosophila melanogaster***
59. The scientist who discovered coupling and repulsion phenomenon
- Bateson
  - Mendel
  - Morgan
  - Punnett
60. Coupling and repulsion are two aspects of same phenomenon called
- Linkage**

- b. Crossing over
- c. Evolution
- d. Variation

61. Genes located on the same chromosome do not separate independently because of

- a. Crossing over
- b. Linkage**
- c. Mutation
- d. Factors interaction

62. Pairing of homologous chromosome is called

- a. Terminalisation
- b. Linkage
- c. Crossing over
- d. Synapsis**

61. The genes located on the same chromosome that are inherited together are known as

- a. Complementary genes
- b. Supplementary genes
- c. Mutant genes
- d. Linked genes**

62. Crossing over in diploid organism is responsible for

- a. Dominance of genes
- b. Segregation of alleles
- c. Recombination of linked genes**
- d. d. Linkage between genes

63. Linkage prevent

- a. Homozygous condition
- b. Segregation of alleles**
- c. Hynrid formation
- d. d. Heterozygous condition

64. A character which is expressed in a hybrid is called

- a. Dominant**
- b. Recessive
- c. Co-dominant
- d. Epistatic

65. Which of the following is extra- nuclear inheritance

- a. Maternal inheritance

- b. Organelle inheritance
- c. Plastid inheritance
- d. **All of the above**

66. Point mutation involves

- a. Deletion
- b. Insertion
- c. Duplication
- d. **Change in single base pair**

67. Transition type of gene mutation is caused when

- a. GC is replaced by TA
- b. CG is replaced by GC
- c. AT is replaced by CG
- d. **AT is replaced by GC**

68. Gene mutation occurs at the time of

- a. DNA repair
- b. **DNA replication**
- c. Cell division
- d. RNA transcription

69. X ray causes mutation by

- a. **Deletion**
- b. Transition
- c. Transversion
- d. Base substitution

70. Damage and errors in DNA cause

- a. **Mutation**
- b. DNA repair
- c. Translation
- d. Transcription

71. Loss of one segment is called

- a. **Deletion**
- b. Duplication
- c. Inversion
- d. Translocation

72. The change in one or two set of chromosome is called

- a. Euploidy
- b. **Aneuploidy**
- c. Polyploidy

- d. Alloploidy
73. The change in entire set of chromosome is called
- Euploidy**
  - Aneuploidy
  - Polyploidy
  - Alloploidy
74. Turner's syndrome is a result of
- Nullisomy
  - Monosomy**
  - Trisomy
  - Polysomy
75. Trisomy is denoted as
- $X+0$
  - $X+1$
  - $2X+1$**
  - $2X+2$
76. Nullisomy is denoted as
- $X-0$
  - $X-1$
  - $2X-2$**
  - $2X-1$
77. Which of the following aneuploidy situation describes the Klinefelter syndrome
- Trisomy 13
  - Trisomy 18
  - Trisomy 21
  - d. 47, XXY**
78. Which of the following aneuploidy situation describes the Turner syndrome
- Trisomy 13
  - Trisomy 18**
  - Trisomy 21
  - 47, XXY
79. Addition or deletion of bases causes which kind of mutation
- Transversion
  - Frameshift mutation**
  - Transition
  - Transcription
80. Which of the following chemical mutagen affects only replicating DNA

- a. Acridine dye
- b. Alkylating agent
- c. Deaminating agent
- d. **Base analog**

81. 5-Bromouracil is the analog of which base

- a. **Thymine**
- b. Guanine
- c. Cytosine
- d. Uracil

82. Which of the following DNA repair mechanism is known as the 'cut and patch mechanism

- a. Photoreactivation
- b. **Nucleotide excision**
- c. Base excision
- d. Mismatch repair

In the following compound which is one of the intercalating agents

- a. **Ethidium**
- b. 5-Bromouracil
- c. Purine
- d. Clastrogen

83. Inversion including centromere is known as

- a. **Paracentric inversion**
- b. Pericentric
- c. Both a and b
- d. None of these

84. The interchange of parts of non- homologous chromosome is called

- a. Duplication
- b. Translocation
- c. **Inversion**
- d. Deletion

85. Which of the following mechanisms will remove uracil and incorporate the correct base

- a. Direct repair
- b. **Base excision repair**
- c. Mismatch repair
- d. Nucleotide excision repair

86. Who discovered genetic drift

- a. **Sewall wright**
- b. Charles Darwin

- c. Moto kimura
- d. Hardy Weinberg

87. Who gave the theory of evolution of species by natural selection

- a. **Darwin**
- b. Mendel
- c. Dalton
- d. morgan

89. Which of the following statement is true about genetic drift

- a. It can cause evolution
- b. It does not affect allele frequency
- c. **It can cause evolution**
- d. It is found in large population

90. The enzyme photolyase is used in what method of repair

- a. Base excision
- b. **Photo reactivation**
- c. Nucleotide excision
- d. None of these

91. Diploid number of chromosomes in fruitfly

- a. 6
- b. 7
- c. **8**
- d. 9

92. Which type of curve shows polygenic inheritance

- a. **Bell-shaped**
- b. Staright
- c. Linear
- d. Zig-zag

93. The reciprocal ratio of cytoplasmic inheritance is

- a. Same
- b. **Different**
- c. Partially same
- d. Partially different

94. Cis-trans test is also known as

- a. Complete test
- b. Incomplete test
- c. **Complementation test**
- d. None of these

95. Genetic drift is change in the allele frequency of a population due to
- Random chance**
  - Natural selection
  - Non-random mating
  - Artificial selection
96. TT genotype indicates
- Recessive gene
  - Dominant gene**
  - Phenotype gene
  - None of these
97. Tt genotypes shows
- Homozygosity
  - Heterozygosity**
  - Heredity
  - None of these
98. Which of the following is not a type of translocation
- Simple
  - Reciprocal
  - Tandem**
  - None
99. Translocation in plants was discovered by
- Stern
  - Barbara McClintok**
  - Sutton and Boveri
  - Morgan
100. ABO blood group is an example of
- Co dominance
  - Multiple allele**
  - Epistasis
  - Mendelian relation

### **SHORT QUESTIONS:**

1. Write short notes on monohybrid cross?
2. Write short notes on dihybrid cross?
3. Write short notes on polygenic inheritance?
4. Write seven characters selected by Mendel for his experiment?
5. Why he selected pea plant as an experimental plant. Give reason?
6. What is first law of Mendel?
7. What is the law of independent assortment?

8. Define Mendelian inheritance. Write its principles?
9. Write short notes on co-dominance?
10. Write short notes on incomplete dominance?
11. Write on epistasis?
12. What is dominant epistasis? Explain with example.
13. What is recessive epistasis? Explain with example.
14. Write short notes on multiple alleles?
15. Explain pleiotropy?
16. What is maternal effect? Explain with suitable example.
17. Why cytoplasmic inheritance is also known as extra-chromosomal inheritance?
18. What is inversion mutation? Explain.
19. Write short notes on translocation mutation?
20. Define linkage and its type?
21. What do you mean by crossing over? When it occurs?
22. Write short notes on synaptonemal complex?
23. What is the importance of crossing over?
24. What are gene mutations and its type?
25. What do you mean by mutagenesis? Mention at least three agents of mutations?
26. Define mutagens and its agent?
27. What is cis-trans complementation test?
28. Define structure of T4 phage?
29. What is allele frequency and genotype frequency?
30. What is speciation?
31. Write short notes on genetic drift?

### **LONG QUESTIONS:**

1. Discuss Mendalism in brief?
2. Why Mendel selected pea plant as his model organism or experimental organisms?
3. What are seven characters chosen by Mendel for his experiment?
4. Discuss Mendel laws of inheritance. Which one of these laws you consider the most important and why?
5. Define epistasis? Explain dominant or recessive epistasis for gene interaction?
6. What is gene interaction? Explain dominance and co-dominance for gene interaction?

7. Define cytoplasmic inheritance? Write an essay on plastid inheritance or mitochondrial inheritance with suitable examples.
8. What do you mean by Mutation? Describe the chromosomal aberration with suitable examples.
9. What is crossing over? Write its characteristic feature and types.
10. Explain three point test cross by giving a suitable example?
11. Explain cytological basis of crossing over?
12. What is numerical aberration? Discuss aneuploidy in a brief with example?
13. Enumerate euploidy in details with example?
14. Discuss DNA repair mechanism.
15. What is mutagenesis? What are the different agents of mutation?
16. What are the chemical and molecular concepts of gene?
17. What is complementation? Explain cis- trans complementation test for alleles?
18. Explain Hardy Weinberg Law?
19. What is genetic drift? Why it plays important role in evolution?
20. What is the role of natural selection in evolutionary genetics?