Anekant Education Society's

TULJARAM CHATURCHAND COLLEGE OF ARTS, SCIENCE & COMMERCE, BARAMATI.

AUTONOMOUS INSTITUTE

QUESTION BANK

Class: F.Y.B.Sc. (Semester – II) Paper Code: ZOO: 1202

Paper: II Title of Paper: Genetics Credit: 2

SHORT ANSWER

1. Define the terms *gene* and *allele* and explain how they differ.
2. Outline how the process of meiosis can lead to Down's syndrome.
3. Outline one example of inheritance involving multiple alleles.
4. Describe the inheritance of ABO blood groups including an example of the possible outcomes of a homozygous blood group A mother having a child with a blood group O father.
5. Explain the concept of sex-linkage with suitable example.
6. Sex-linked diseases are more common among men than women. Justify this statement with suitable example.
7. Distinguish between male and female *Drosophila*.
8. What is karyotype? Explain its importance in brief.
9. Explain the concept of syndrome with suitable example.
10. Give classification of chromosomes based on position of centromer.
11. State law of dominance with suitable example.
12. State low of segregation with suitable example.
13. Explain the concept of codominance with suitable example.
14. Explain the concept of incomplete dominance with suitable example.
15. Explain the inheritance of complementary factors.
16. Explain the inheritance of inhibitory factors.
17. Explain the inheritance of duplicate dominant factors.
18. Explain the inheritance of supplementary factors.
19. Write a note on pleiotropism.
20. Write a note on lethal genes in *Mus musculus*.
21. A man with blood type B marries a woman with blood type A. Their first child is blood type O. What is the probability their next child will be blood type B? What is the probability that their next child will have blood type AB?
22. What mode of inheritance does alkaptonuria show?
23. What mode of inheritance does phenylketonuria show?
24. What mode of inheritance does albinism show?
25. Explain the concept of parthenogenesis with suitable example.
26. Explain the concept of gynandromorphsim with suitable example.

27. Explain haplo-diploidy.
28. Explain sex-determination in hen.
29. Explain sex-determination in *Drosophila*.
30. Explain environmental sex-determination with suitable example.
31. Give practical applications of Mendelian crosses.
32. A progeny of F1, is crossed with the homozygous recessive parent. What is this cross called? Work out how is it useful?
33. In monohybrid cross of red and white flower, Mendel got only red flower. On setting the F1 plants having red flower he got both plants with red and white flower. Explain the basis of using RR and rr symbols to represent the genotype of plants of parental generation.
34. A, B,D are three independently assorting genes with their recessive alleles a, b, d respectively. A cross was made between individuals of Aa bb DD genotype with aa bb dd. Explain the type of genotypes of the offspring produced.
35. Explain the cross showing same genotypic and phenotypic ratio in F2 generation.
36. What is the percentage of males becoming colour blind when the mother is a carrier and father is a normal-visioned person? Explain.
37. State Mendel's law of dominance & law of segregation.
38. Why did Mendel select pea plants for his experiments?
39. Define the terms: Heterozygous, Genotype.
40. Explain test cross with example/significance.
41. Define heredity & variations.
42. Distinguish between homozygous & heterozygous.
43. State & explain law of segregation.
44. Explain backcross with significance.
45. When a homozygous pea plant with inflated pods is crossed with a homozygous pea plant with constricted pods, all offsprings show inflated pods. What does this indicate?
46. A homozygous tall pea plant with red flowers was crossed with a dwarf plant with white flowers and F2 generation was raised. What will be proportion of tall plants and dwarf plants in F2 generation? Explain.
47. Explain the terms genotype & phenotype with suitable examples.
48. Is law of purity of gametes applicable to homozygous plants? Explain with suitable example.
49. A homozygous tall pea plant, which is also homozygous for red colour of flower, is crossed with a dwarf pea plant producing white flowers. Find out proportion of offsprings in F2 generation of this cross by checkerboard method.
50. State Mendel's law of independent assortment & explain it with suitable cross.
51. Explain monohybrid cross with suitable example.
52. Explain dihybrid cross with suitable example.
53. Give any four pairs of contrasting traits in garden pea plant.

54. What is monohybrid cross? Explain it with the help of checkerboard method. Give phenotypic & genotypic ratios for the same.
55. A pea plant homozygous for axillary (A) & red flowers (R) is crossed with another plant homozygous for terminal (a) & white flowers (r). Find out proportion of offspring in F2 generation by Checkerboard method. Mention its phenotypic ratio.

SAMPLE LONG ANSWER QUESTIONS

1. What is criss-cross inheritance? Explain with suitable examples. Why do the genes showing such inheritance show diseases commonly among men?
2. What is autosomal trisomy? How does the process of meiosis lead to such condition? Explain one example of autosomal trisomy.
3. Describe numerical and structural aberrations in chromosomeswith suitable examples.
4. Genes for different characters form various new combinations during gametogenesis. Justify this statement with suitable Mendelian cross.
5. Perform the Mendelian dihybrid cross to find out phenotypic and genotypic ratio of F2 generation.
6. Gametes are always pure for all characters. Justify this statement with suitable Mendelian experiment.
7. Describe morphology, sexual diamorphism and life cycle of fruit fly.
8. Explain inheritance of skin colour and sickle cell anaemia in human.
9. Avoiding close marriage is an important way to avoid inheritance of genetic disorders. Justify the statement with any two suitable examples.
10. Explain inheritance of ABO and Rh-factor and its medico-legal importance.

DEFINE / EXPLAIN

1. Factor
2. Gene
3. Allele
4. Allelomorph
5. Dominant
6. Recessive
7. Homozygous
8. Heterozygous
9. Hemizygous
10. F1 generation
11. F2 generation
12. Test cross
13. Back cross
14. Pure line
15. Pleiotropism
16. Epistasis
17. Codominance
18. Incomplete dominance
19. Linkage
20. Allosome
21. Autosome
22. Monosomy
23. Nullisomy
24. Trisomy
25. Inversion
26. Deletion
27. Transversion
28. Translocation
29. Non-disjunction
30. Albinism
31. Phenylketonuria.
32. Alkaptonuria
33. Down's syndrome
34. Klinefelter's syndrome
35. Turner's syndrome
36. Cri du chat syndrome
37. Hypertrichosis
38. Haemophilia
39. Idiogram
40. Karyotype
41. Parthenogenesis
42. Gynandromorphism
43. Mongolism
44. Inhibitory factor
45. Supplementary factor

SAMPLE MULTIPLE CHOICE QUESTIONS

1. A woman is heterozygous for an X-linked recessive allele causing albinism. If she marries a non-albino man, what proportion of her female and male offspring will inherit the albinism allele?
   a. All, none b. all, half c. half, half d. half, all
2. Duplicate dominant factors show the genotypic ratio of
   a. 9:3:3:1 b. 9:7 c. 15:1 d. 9:3:4
3. Mongolism is caused due to
   a. monosomy of X-chromosome b. trisomy of 21st chromosome
   c. nullisomy of Y-chromosome d. monosomy of 21st chromosome
4. Which of the following is produced by parthenogenesis?
   a. human b. *Drosophila* c. drone d. queen bee
5. XX-XY sex determination is present in
   a. human b. honey bee c. butterfly d. hen
6. Hemophilia is a sex-linked recessive trait in humans. If a father and a son are both hemophiliacs, but the mother is normal, her genotype must be:
   a. X^hX^h b. $X X^h$ c. XX d. X^hY
7. An example of alleles is:
   a. AB and Tt. b. TT and Tt. c. T and t. d. X and Y
8. An example of a genotype is:
   a. A tall pea plant. b. R and r. c. TtHH. d. Hemophiliac.
9. Which blood type would not be possible for children of a type AB mother and a type A father? a. O b. A c. AB d. B
10. Which statement concerning a pair of alleles for a gene controlling a single characteristic in humans is true?
    a. Both genes come from the father.
    b. Both genes come from the mother.
    c. One gene comes from the mother and one gene comes from the father.
    d. The genes come randomly in pairs from either the mother or father.
11. Carriers of the colour-blindness trait include:
    a. Men who are heterozygous for the trait.
    b. Men who are homozygous for the trait.
    c. Women who are heterozygous for the trait.
    d. Women who are homozygous for the trait.
12. Normal human eggs have:
    a. 22 autosomes and an X chromosome.
    b. 22 autosomes and a Y chromosome.
    c. 23 autosomes. d. 46 chromosomes

13. When Mendel crossed a plant producing yellow round seeds with a plant producing green wrinkled seeds, he obtained both parental combinations and recombinations in the F2 generation. The ratio between parental combinations & recombinations was:

    a. 9:3:3:1 b. 10:6 c. 9:7 d. 15:1

14. If a gene on the X chromosome does not have a corresponding allele on the Y chromosome, this condition is known as:

    a. heterozygous condition b. holozygous condition
    c. hemizygous condition d. homozygous condition

15. In pea plants yellow colour of seeds is dominant over green and round shape is dominant over wrinkled. A plant producing yellow round seeds is crossed with a plant producing green wrinkled seeds. F1 generation consists of yellow round, yellow wrinkled, green round and green wrinkled in the ratio of 1:1:1:1. Hence the genotype of the yellow round parent is

    a. YYRR b. YYRr c. YyRR d. YyRr

16. If a couple have 4 children, each belonging to blood groups A, B, AB and O, then the genotypes of the couple are:

    a. Homozygous for A and B
    b. Homozygous for A and heterozygous for B
    c. Heterozygous for A and B
    d. Heterozygous for A and homozygous for B

17. In 4 O'clock plant Mirabilis jalapa, pink flower-producing plants were produced when:

    a. 2 red flowered plants were crossed
    b. a pink flowered plant was crossed with a white flowered plant
    c. two white flowered plants were crossed
    d. a red flowered plant was crossed with a white flowered plant

18. The phenotypic ratio in a monohybrid cross showing incomplete dominance is:

    a. 9:3:3:1 b. 1:2:1 c. 3:1 d. 1:2:1:2:4:2:1:2:1

19. A test cross means:

    a. The F1 organism is allowed to self pollinate.
    b. The F1 organism is crossed back to the dominant parent.
    c. The homozygous dominant parent is crossed with the recessive parent.
    d. The F1 organism is crossed back to the recessive parent.

20. A child which is afflicted with one of the following disorders cries like a cat:

    a. Hemophilia b. Cri du chat syndrome
    c. Sickle cell anaemia d. Turner's syndrome