HOLIDAYS ASSIGNMENT
CLASS XII
BIOLOGY
SESSION 2016-17
ASSIGNMENT ON GENETICS

1. A Snapdragon plant homozygous for red flower, when crossed with a plant bearing white flower of the same species produces pink flowersin F1 generation.
    a. What is the phenotypic expression called?
    b. Work out cross to show the F2 generation when F1 was self pollinated. Give the phenotypic and genotypic ratios of F2-generation.
    c. How do you compare the F2 phenotypic and genotypic ratio with those of Mendelian monohybrid F2 ratios?
2. A woman with blood group O, whose father has type A blood group and mother has type B, has a child with blood group type O. There is a dispute over the identity of the child's father. Two men are possible fathers. One is type AB and other is type A.
    a. What is the mother's genotype?
    b. Which man could be father?
    c. If this man is the father, what is his genotype?
    d. What are the genotype of the woman's parents?
3. A true breeding pea plant, homozygous for inflated and green pods (FFGG) is crossed with another pea plant with constricted and yellow pods (ffgg)
    a. Work out the cross to show the phenotypes and genotypes of F1 & F2 generations. Give the phenotype ratio of F2 generation.
    b. List the laws of Mendel, which can be derived from such a cross.
4. A homozygous tall pea plant with green seeds is crossed with a dwarf pea plant with yellow seeds.
    a. What would be the phenotype and genotype of F1?
    b. Work out the phenotypic ratio of F2 – generation with the help of Punnett's square.
5. A particular garden pea plant produces only violet flowers.
    a. Is it homozygous dominant, since, it produces only violet flowers.
    b. How would you ensure its genotype? Explain with the help of crosses.
6. With the help of one example each, provide genetic explanation for the following observations.
    a. F1 generation resembles both the parents.
    b. F1 generation does not resemble the parents.
7. (i) You are given tall pea plants with yellow seeds, whose genotype are unknown. How would you find the genotype of these plants? Explain with the help of cross.
8. A non-haemophilic was informed by their doctor that there is possibility of a haemophilic child to be born to them. Explain the basis on which the doctor conveys this information. Give the genotype and the phenotypes of all the possible children who could be born to them?
9. Explain the pattern of inheritance of haemophilia in humans, why is the possibility of a human female become haemophilic is extremely rare? Explain.
10. Recently a baby girl has been reported to suffer from haemophilia. How is it possible? Explain it with the help of a cross.
11. How is sex determined in humans ? Compare with birds.

12. (i) Why are grasshopper and Drosophila said to show male heterogamety? Explain. (ii) Explain female heterogamety with the help of examples.
13. Name a disorder, give the karyotype and write the symptoms, where human male suffer as a result of an additional X chromosome.
14. (i) Sickle cell anaemia in human is a result of point mutation. Explain. (ii) Write the genotype of both the parents, who has produced a sickled-celled anaemic child.
15. What is pedigree analysis? Suggest how such an analysis can be useful.
16. Marriage between a colorblind man and a normal woman produces all carrier females and normal male. Illustrate this condition by the cross.
17. Why do the sons of a haemophilic father never suffer from this trait?
18. Write the chromosomal constitution and the resulting sex in each of the following syndrome.
    a. Turner's Syndrome b. Klinefelter's Syndrome.
19. The human male never passes on the gene for red-green color blindness to his son. How is it so?
20. How is the child affected if it has grown from the zygote formed by an XX-egg fertilised by Y-carrying sperm? What do you call this abnormality.
21. Why does the son of carrier mother and a normal father suffer from haemophilia, whereas, the son of a haemophilic father and a normal mother would not?
22. What is codominance? Explain it with a suitable example.
23. Explain the sex determination mechanism in human, birds and grasshopper.
24. Define and design the law of segregation given by Mendel with the help of a monohybrid cross.
25. A child has a blood group 'O'. If the father has blood group 'A' and mother has blood group 'B', work out the genotypes of parents and the possible genotype of other offsprings.
26. (i) Explain monohybrid cross taking seed coat colour as a trait in *Pisum sativum.* Work out the cross upto F2 generation.
27. In a dihybrid cross, white eyed, yellow bodied female *Drosophila* crossed with red eyed , brown bodied male *Drosophila*, produced in F2-generation are 1.3% recombinants and 98.7% progeny with parental type combinants. This observation of Morgan deviated from Mendelian F2 phenotypic dihybrid ratio. Explain, giving reasons Morgan's observation.
28. With the help of one example each, provide genetic explanation for the following observations.
29. Discuss with examples :
    a. Polygenic inheritance
    b. Pleiotropy
30. Give important postulates of Chromosomal Theory of Inheritance.
31. State the theory 0f biogenesis. How does Miller's experiment support this theory?
32. The study of
    a. Fossils of dinosaurs.
    b. Forelimbs of Cheetah, Bat, whale & Human.
    c. Eyes of Octopus & Mammals. Show that evolution of life forms has indeed took place on earth, Explain.
33. Darwin, after his observation on finches in Galapagos islands concluded that all the finches evolved from the original seed-eating features to become insectivorous and vegetarian finches with different eating habits by altering their beaks. The following questions can be framed on the basis of above mentioned information.
    a. What value you get from this situation?
    b. What would have happened if all the finches had the same eating habit.

c. What is this type of evolution called? What has this resulted in?

34. Define fossils. Give any two
35. Trace the various components of Human evolution (hint: brain size and function, skeletal structure, dietary preference etc.
36. (a) Name the primate that lived about 15 million years ago. List their characteristic features. (b) (i) Where was the first man like animal found? (ii) Write the order in which Neanderthals, *Homo habilis* and *Homo erectus* appeared on earth. State the brain capacity of each one of them. (iii) When did modern Homo sapiens appear on this planet?
37. When and where did Neanderthal man live? What was his brain capacity?
38. Give in a chronological order the names of the different species in the evolution of the genus *Homo*.
39. Tool use was the fundamental to all hominid behaviour. State whether tool-use pre-dated bipedal walking & vice –versa.
40. The primitive atmosphere was reducing. Explain with reason.
41. Name the three amino acids that were produced by abiotic synthesis in Miller and Urey's experiment.
42. Name the most accepted theory of origin of life on earth .Who proposed this theory?
43. About 1 kg fully boiled milk was left uncovered in a vessel. It developed bacteria in it after some time causing curdling. What conclusion can be drawn from this data in the context of origin of life and why?
44. Name one organ analogous to the wings of the bird. Why are they both analogous? Can you include the wing of a bat also with them under the same category? Give reasons.
45. What is divergent evolution? Give its examples. How does it differ from the convergent evolution?
46. Why do mosquitoes not completely eliminate from the world?
47. Can we call human evolution as adaptive radiation?
48. What is saltation?
49. Mention the salient features of de Varies's theory of mutation. Comment on the generalisation made by him on evolution.
50. Explain the salient features of Hugo de Varies theory of Mutation. How is Darwin's theory of Natural Selection differs from it.
51. State Hardy-Weinberg principles.
52. Explain the various factors which are known to affect Hardy-Weinberg equilibrium.
53. In a certain population, the frequency the three genotypes is as follows:

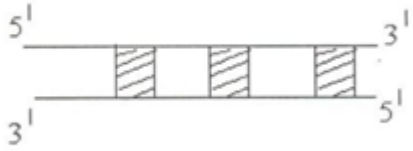
Genotype	:	BB	Bb	bb
Frequency	:	22%	62%	16%

What is the likely frequency of B & b alleles?

54. The allele frequency in a population is stable and constant from generation to generation. Answer the following :
    a. Name the underlying principle.
    b. Give the value of sum total of all the allelic frequencies in a population.
    c. What would happen if this principle is disturbed?
55. Explain any three factors affecting allele frequency in population.

56. The progeny of a sexually reproducing organism is never the replica of the parent in all repects. Mention any four factors that cause this variation.
57. List the most important characteristic criteria for designating a Mendelian population.
58. "Migration may enhance or blurr the effects of selection". Comment.
59. Define genetic drift. How does it produce founder effect and genetic bottleneck?
60. What is genetic variability? Name any two sources of variation in the gene pool.
61. While creation and presence of variation in directionless, natural selection is directional as it is in the context of adaptation. Commnt.
62. What is differential reproduction? How does it help in evolution?
63. Trace the evolutionary stages of any one animal say horse.
64. How can the long neck of giraffe be explained through the principle of natural selection? How does it differ from the Lamarckian interpretion?
65. What is 'Differential Reproduction'? How does it lead to adaptation?
66. How does the work of Thomas Malthus influence Darwin ?
67. Describe one example of adaptive radiation.
68. Explain the three different ways the natural selection can affect the frequency of a heritable trait in a population with the help of graphs.
69. Explain why chemical insectides usually remain useful only for a limited time?
70. How does industrial melanism bring out the action of natural selection?

71. Name the factors for RNA polymerase enzyme which recognises the start and termination signals on DNA for transcription process in Bacteria.
72. Mention the function of non-histone protein.
73. During translation what role is performed by tRNA
74. RNA viruses mutate and evolve faster than other viruses. Why?
75. Give six points of difference between DNA and RNA in their structure/ chemistry and function.
76. Explain how does the hnRNA becomes the mRNA.
77. Explain the process of splicing, capping and tailing which occur during transcription in Eukaryotes.
78. Name the three major types of RNAs, specifying the function of each in the synthesis of polypeptide.
79. Enlist the goals of Human genome project.
80. A tRNA is charged with the amino acid methionine.
    (i) Give the anti-codon of this tRNA.
    (ii) Write the Codon for methionine.
    (iii) Name the enzyme responsible for binding of amino acid to tRNA.
81. Illustrate schematically the process of initiation, elongation and termination during transcription of a gene in a bacterium.
82. What is meant by semi conservative replication? How did Meselson and Stahl prove it experimentally?
83. What does the lac operon consist of? How is the operator switch turned on and off in the expression of genes in this operon? Explain.
84. State salient features of genetic code.
85. Describe the process of transcription of mRNA is an eukaryotic cell.
86. **Illustrate below is a DNA segment which constitutes a gene.**



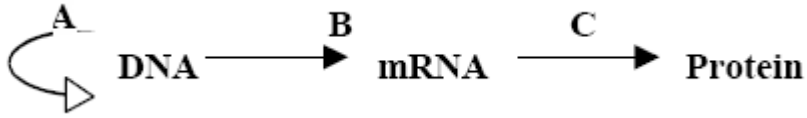
i) Will the whole gene be transcribed in RNA primarily?

ii) Name the shaded & unshaded part to the gene,

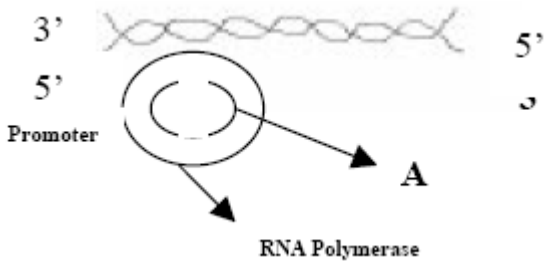
iii) Explain how is gene expressed.

iv) How is the gene different from prokaryotic gene in its expression?

87. **Which of the two –the coding strands or the template strands-will the RNA transcribed by the DNA, resembles? Why? How will they yet differ from each other?**
88. **1. There are proteins which are positively charged and there are also negatively charged proteins. What makes the protein get its charge?**
89. **What is ESTs?**
90. **A particular human gene has the largest number of bases. Identify it.**
91. **Why is mRNA of eukaryotic cells said to monocistronic, while that of prokaryotic cell is polycistronic?**
92. **A point mutation leads to adverse change in the function of hemoglobin (B-globin chain). Identify the disease that may occur due to this mutation. Mention the change of amino acids in the polypeptide due to mutation.**
93. **Why the strand 5'-3' is called coding strand though it does not take part in transcription?**
94. **Complete the following, label A,B and C and name the process(Dogma).**

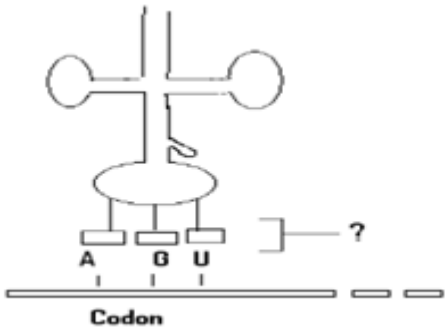


95. **The diagram depicts a stage in transcription. Mention the stage and indicate A**



96. Amino acid Arginine if coded by CGU; how many codons can code for this amino acid?

97. Write the anticodon of the given t-RNA



98. What is the difference between RNAs and RNase .

99. A segment of DNA, TTC AGG GGG ATG was translated into an oligopeptide lysine-serine-proline- tyrosine.

(i) Write the codons for the four amino acids.

(ii) If the first adenine in the DNA segment is substituted by guanine, what will be the sequence of amino acids in the new oligopeptide?

(iii) Write the anticodons for these amino acids?

100. (i)(a) At what end of the tRNA is the amino acid attached?

(b) What is the mRNA codon that codes for phenyl alanine?

(c) Name the enzyme responsible for this attachment?

(d) Give the anticodon of this tRNA?

(ii) Explain the idea expressed in the following representation: DNA=RNA=protein