Marks: 35 **Time: 45 min**

1. What is the relationship between DNA, Gene and chromosome? 2
2. How do variations arise in asexually reproducing organisms? How do they transfer their genes to the progeny? 2
3. What is the law of dominance of traits? Explain with an example. 3
4. Why are some traits like learning a language, acquired during the lifetime nor inherited? Explain. 2
5. How did Mendel explain that a trait may be inherited but not expressed? 2
6. Sex determination in humans depends on the 23rd pair of chromosomes called the sex chromosomes. If it was a homologous pair -XX, it would be a female. If it is a heterologous pair, XY, then it is a male.
   a. How many types of eggs /ova and how many types of sperms can be produced in humans.
   b. Which parent's gamete determines the sex of the child?
   c. What is the sex chromosome pair present in the zygote that forms a male child? 3
7. After self pollination, in pea plants with round, yellow seeds, the following types of seeds are obtained—

Seed	Number
Round yellow	630
Round green	216
Wrinkled yellow	202
Wrinkled green	64

   Analyse the result and describe the mechanism of this inheritance. 3
8. If a trait A exists in 10% of the population and trait B in 60% of the same population, which trait is likely to have arisen earlier? Explain. 2
9. List 4 traits that were studied by Mendel in pea plants. 2
10. Explain with an example how genes control traits. 3
11. A blue colour flower plant denoted by BB is cross-bred with that of white flower type- bb.
    a. What is the colour of the flower you would expect in the F1 generation plants.
    b. What will be the percentage of white flower plants in F2 generation if the flowers of F1 are self pollinated?
    c. State the expected ratio of genotypes BB and Bb in the F2 progeny. 3
12. What are linked genes? Explain. 2
13. Plant with full green pod is said to be homozygous dominant. Plant with constricted yellow pod is said to be homozygous recessive. Crossing of these two plants can also give rise to full yellow pod, plants with constricted green pod are also produced.
    a. What conclusion could Mendel draw from this observation?
    b. Work out a cross up to F2 generation for such type. 4
14. Crossing of a pea plant with purple flower and pea plant with white flowers, produces 50 plants with only purple flowers. On selfing, the plants produced 470 plants with purple flowers and 160 with white flowers. Explain the genetic mechanism responsible for this observation. What did Mendel conclude from such observations? 3