

1. Explain giving two reasons why pollen grains can be best preserved as fossils.
2. Give reasons why :-
  - (i) Most zygote in angiosperms divide only after certain amount of endosperm is formed.
  - (ii) Micropyle remains as a small pore in the seed coat of a seed.
  - (iii) Integuments of an ovule harden and the water content is highly reduced, as the seed matures.
3. Why is pedigree analysis done in the study of human genetics? State the conclusions that can be drawn from it.
4. a) A pea plant bearing axial flower is crossed with a pea bearing terminal flowers. The cross is carried out to find the genotype of the pea plant bearing axial flowers. Work out the cross to show the conclusions you arrive at.  
b) State the Mendel's law of inheritance that is universally acceptable.
5. How has the use of *Agrobacterium* as vectors helped in controlling *Meloidogyne incognita* infestation in tobacco plants? Explain in correct sequences.
6. Forensic department was given three blood samples. Write the steps of the procedure carried to get the DNA finger printing done for the above sample.
7. a) Why is an antibody represented as L<sub>2</sub>H<sub>2</sub>?  
b) Name the types of cell the AIDS virus first enters into after getting inside human body. Explain the sequence of events that virus undergoes within these cells to increase their progeny.
8. Mention the product produced and its use by each of the microbes listed below : a) *Streptococcus* b) *Lactobacillus*, c) *Monascus purpureus*
9. i) Describe the different steps in one complete cycle of PCR.  
ii) State the purpose of such an amplified DNA sequence.
10. How is Bt cotton plant created as a GM Plant? How is it protected against bollworm infestation?
11. Explain menstrual cycle in human females.
12. State the 'central dogma' as proposed by Francis Crick. Are there any exceptions to it? Support your answer with a reason and an example.
13. Explain how the biochemical characterization (nature) of 'Transforming Principle' was determined, which was not defined from Griffith's experiment.
14. Draw a diagrammatic sectional view of human ovary showing different stages of oogenesis along with corpus luteum.
15. Where is morula formed in human? Explain the process of its development from zygote.
16. Draw a schematic labeled diagram of a fertilized embryo sac of an angiosperm.
17. Describe the stages of embryo development in dicot embryo.

18. Draw a labelled diagram of a sectional view of human seminiferous tubule.
19. Differentiate between gametogenesis in human males and females on the basis of
  - i) time of initiation of process.
  - ii) Products formed at the end of the process.
20. ABO blood grouping in human population exhibits four possible phenotypes from six different genotypes. Explain different mechanisms of inheritance involved in exhibiting the possibility of four phenotypes and six genotypes.
21. When and where are primary oocytes formed in human female? Trace the development of these oocytes till ovulation (in menstrual cycle). How do gonadotropins influence this developmental process?
22. Write the scientific name of the organism Thomas Hunt Morgan and his colleagues worked with for experiments. Explain the correlation between linkage and recombination with respect to genes as studied by them.
23. How did Sturtevant explain gene mapping while working with Morgan.
24. How did Hershey and Chase arrive at the conclusion that DNA is genetic material.
25. Describe Meselson and Stahl's experiment to prove that DNA replication is semiconservative.
26. Nematode specific genes are introduced into the tobacco plants using Agrobacterium vectors to develop resistance in tobacco plants against nematodes. Explain the events that occur in tobacco plant to develop resistance.
27. Write the scientific name of the soil bacterium which produces cry proteins. How are these proteins useful in agriculture.
28. How did an American company Eli Lilly use the knowledge of r-DNA technology to produce human insulin.
29. Name and describe the technique that helps in separating the DNA fragments formed by the use of restriction endonuclease.
30. Secondary treatment of the sewage is also called as Biological treatment. Justify this statement and explain the process.
31. Explain outbreeding, outcrossing and crossbreeding practices in animal husbandry.
32. Expand MOET. Explain the procedure of this technology in cattle improvement.
33. List the causal organism, symptoms (any three), mode of contamination of the following diseases – a) Amoebiasis b) Ascariasis c) Filariasis
34. Write the sequence of human ancestors with their time of origin and cranial capacity.
35. Differentiate between the explanation given by Darwin and de Vries respectively on the mechanism of evolution.

36. One of the codons on mRNA is AUG. Draw the structure of tRNA adaptor molecule for this codon. Explain the uniqueness of this tRNA.
37. What is hnRNA? Explain the changes hnRNA undergoes during its processing to form mRNA.
38. Unambiguous, universal and degenerate are some of the terms used for the genetic code. Explain the salient features of each of them.
39. Explain the zygote intra fallopian transfer technique (ZIFT). How is intra uterine transfer technique (IUT) different from it?
40. Explain the events taking place at the time of fertilization of an ovum in human female. Name and draw a labelled sectional view of the embryonic stage that gets implanted.
41. i) Draw a sectional view of seminiferous tubule of a human. Label the following cells in the seminiferous tubule :-
  - a) Cells that divide by mitosis to increase their number.
  - b) Cells that undergo meiosis I
  - c) Cells that undergo meiosis II
  - d) Cells that help in the process of spermiogenesis.
42. Describe how the changing levels of FSH, LH and progesterone during menstrual cycle induce changes in the ovary and the uterus in human female.
43. Why does endosperm development precede embryo development in angiosperm seeds, state the role of endosperm in mature albuminous seeds.
44. Explain the process of artificial hybridisation to get improved crop variety in i) plants bearing bisexual flowers ii) female parent producing unisexual flowers.
45. Describe any two devices in a flowering plant which prevents both antogamy and geitonogamy.
46. Explain the events upto double fertilization after the pollen tube enters one of the synergids in an ovule of an angiosperm.
47. Name the material used as matrix in gel electrophoresis and mention its role.
48. Identify the reason for selection of DNA polymerase from *Thermus aquaticus* for polymerase chain reaction.
49. Give an example of an organism that exhibit xo-type of sex determination. What is this sex determination designated as?
50. At what ends do capping and tailing of hnRNA occurs respectively?
51. A male honeybee has 16 chromosomes whereas its female has 32 chromosomes. Give one reason.
52. Name any two types of cells which act as cellular barriers to provide innate immunity in humans.
53. A mother of one year old daughter wanted to space her second child. Her doctors suggested cuT. Explain its contraceptive actions.
54. Mention the site where fertilization occurs in amphibians and reptiles respectively.

55. Name the material used as matrix in gel electrophoresis and mention its role.
56. Identify the reason for selection of DNA polymerase from *Thermus aquaticus* for polymerase chain reaction.
57. Give an example of an organism that exhibits XO-type of sex determination. What is this sex determination designated as?
58. At what ends do capping and tailing of hnRNA occur respectively?
59. Name the embryonic stage that gets implanted in the uterine wall of a human female.
60. Let 'Y' be the genotypic symbol for dominant yellow seed colour, symbol 'y' for recessive green seed colour, symbol 'R' for dominant round shape of seed and symbol 'r' for recessive wrinkled seed shape in garden pea. Using these symbols explain Mendel's law of independent assortment.

