Time**: 3hrs;** Total Marks**: 70**

General Instruction:

1. There are total **26** questions and five sections in the question paper.
2. All questions are compulsory
3. Section A contains questions number **1 to 5**; very short answer type questions of 1 mark each.
4. Section B contains questions number **6 to 10**, short-answer type I questions of 2 marks each.
5. Section C contains questions number **11 to 22**, short answer type II questions of 3 marks each.
6. Section D contains question number **23**, value based question of 4 marks.
7. Section E contains questions number **24 to 26**, long-answer type questions of 5 marks each.
8. There is no overall choice in the question paper; however, an internal choice is provided in one question of 2 marks, one question of 3 marks and all the three questions of 5 marks. In these questions, an examinee is to attempt any of the two given alternatives.

SECTION – A

1. Name the type of cross that would help to find the genotype of a pea plant bearing violet flowers.
2. State two postulates of Oparin and Haldane with reference to origin of life.
3. A herd of cattle is showing reduced fertility and productivity. Provide one reason and one suggestion to overcome this problem
4. What are Cry genes? In which organism are they present?
5. An electrostatic precipitator in a thermal power plant is not able to generate high voltage of several thousands. Write the ecological implication because of it.

SECTION – B

6. A pollen grain in angiosperm at the time of dehiscence from an anther could be 2-celled or 3-celled. Explain. How are the cells placed within the pollen grain when shed at a 2-celled stage?
7. Differentiate between the genetic codes given below:
   (a) Unambiguous and Universal
   (b) Degenerate and Initiator
8. Mention one application for each of the following:
   (a) Passive immunization
   (b) Antihistamine
   (c) Colostrum
   (d) Cytokine-barrier
9. Name the microbes that help production of the following products commercially:
   (a) Statin (b) Citric acid (c) Penicillin (d) Butyric acid
10. List four benefits to human life by eliminating the use of CFCs.

    Or

    Suggest two practices giving one example of each that help protect rare or threatened species.

SECTION – C

11. (a) Can a plant flowering in Mumbai be pollinated by pollen of the same species growing I New Delhi? Provide explanations to your answer.
    (b) Draw the diagram of a pistil where pollination has successfully occurred. Label the parts involved in reaching the male gametes to its desired destination.
12. Both Hemophilia and Thalassemia are blood related disorders in humans. Write their causes and the difference between the two. Name the category of genetic disorder they both come under.

13. (a) List the two methodologies which were involved in human genome project. Mention how they were used.
    (b) Expand 'YAC' and mention what it was used for.
14. Write the characteristics of Ramapithecus, Dryopithecus and Neanderthal man.
15. Name a human disease, its causal organism, symptoms (any three) and vector, spread by intake of water and food contaminated by human faecal matter.

    Or

    (a) Why is there a fear amongst the guardians that their adolescent wards may get trapped in drug/alcohol abuse?
    (b) Explain 'addiction' and 'dependence' in respect of drug/alcohol abuse in youth.
16. (a) Write the desirable characters a farmer looks for in his sugarcane crop.
    (b) How did plant breeding techniques help north Indian farmers to develop cane with desired characters?
17. Secondary treatment of the sewage is also called Biological treatment. Justify this statement and explain the process.
18. (a) Explain the significance of 'palindromic nucleotide sequence' in the formation of recombinant DNA.
    (b) Write the use of restriction endonuclease in the above process.
19. Describe the roles of heat, primers and the bacterium Thermus aquaticus in the process of PCR.
20. Explain the various steps involved in the production of artificial insulin.
21. (a) "Organisms may be conformers or regulators. "Explain this statement and give one example of each.
    (b) Why are there more conformers than regulators in the animal world?
22. Describe the inter-relationship between productivity, gross primary productivity and net productivity.

SECTION D

23. It is commonly observed that parents feel embarrassed to discuss freely with their adolescent children about sexuality and reproduction. The result of this parental inhibition is that children go astray sometimes.
    (a) Explain the reasons that you feel are behind such embarrassment amongst some parents to freely Discuss such issues with their growing children.
    (b) By taking one example of a local plant and animal, how would you help these parents to overcome such Inhibitions about reproduction and sexuality

SECTION E

24. (a) When a seed of an orange is squeezed, many embryos, instead of one are observed. Explain how it is possible.
    (b) Are these embryos genetically similar or different? Comment

    Or

    (a) Explain the following phases in the menstrual cycle of a human female:
    I. Menstrual phase II. Follicular phase III. Luteal phase
    (b) A proper understanding of menstrual cycle can help immensely in family planning. Do you agree with the statement? Provide reasons for your answer.
25. (a) Compare, given reasons, the J-shaped and S-shaped models of population growth of a species.
    (b) Explain "fitness of a species" as mentioned by Darwin.

    Or

    (a) What is an ecological pyramid? Compare the pyramids of energy, biomass and numbers.
    (b) Write any two limitations of ecological pyramids.
26. (a) Describe the structure and function of a t-RNA molecule. Why is it referred to as an adapter molecule?
    (b) Explain the process of splicing of hn-RNA in a eukaryotic cell.

    Or

    Write the different components of a lac-operon in E coil explain its expression while in an open state.