

Time 3 Hrs.

M.M. 70

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper has four sections: Section A, Section B, Section C and Section D. There are 33 questions in the question paper.
- (iii) Section–A has 14 questions of 1 mark each and 02 case-based questions. Section–B has 9 questions of 2 marks each. Section–C has 5 questions of 3 marks each and Section–D has 3 questions of 5 marks each.
- (iv) Wherever necessary, neat and properly labeled diagrams should be drawn.

SECTION A

1. How is the presence of cyanobacteria in the paddy field beneficial to the paddy crop?
2. How does the flow of genetic information in HIV deviate from the central dogma proposed by F. Crick?
3. How is fertilization by a self-incompatible pollen prevented in an angiosperm?
4. State the principle on which ELISA works?
5. Define the term endemism?
6. How is primary spermatocyte different from a secondary spermatocyte.
7. How many base pairs would a DNA segment of length 1.36 mm have?
8. LAB, when added to warm milk, convert it into curd. Mention two other benefit the LAB provide to human beings?
9. What is meant by gene cloning?
10. If a colourblind woman marries a normal man, what is the probability of their children being colourblind?

Instruction for questions from 11 to 14:

- a. Both assertion and reason are true, and reason is the correct explanation of assertion.
- b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
- c. Assertion is true but reason is false.
- d. Both assertion and reason are false.

11. Assertion: In eukaryote, the primary RNA transcript has to undergo splicing.

Reason: In eukaryotes, the primary RNA transcript has non-coding sequences, called introns.

12. Assertion : In human testes, the region outside the seminiferous tubules, are called interstitial spaces, where leydig's cell are present.

Reason : Leydig's cell synthesise and secrete the hormone, testosterone.

OR

Assertion : In angiosperm the growth of male gametophyte occurs partially inside the microsporangia of anther and partially on the pistil

Reason : the complete growth and development of female gametophyte of angiosperms occurs inside the ovule.

13. Assertion: An alien piece of DNA inserted into a host cell/ organism, generally does not replicate if not inserted into a chromosome.

Reason: DNA replication is initiated in specific DNA sequences, called 'Ori' on the chromosomes.

14. Assertion : Oral pills are ver effective contraceptives with lesser side effects.

Reason : These pills inhibit ovulation and implantation.

15. Read the following and answer any *four* questions from 15(i) to 15(v) given below:

Regional and local variations within each biome lead to the formation of a wide variety of habitats. The abiotic conditions in different habitats vary drastically from one another. Over a period of time, organisms have evolved through natural selection adaptation to optimize their survival and reproduction in their habitats. Many species have evolved a relatively constant internal environment called homeostasis. Some of them maintain homeostasis through physiological means while some others through behavioural means.

(i) Select the correct statement about homeostasis.

- a. Homeostasis could be in terms of optimal temperature or optimal osmotic concentration of body fluid.
- b. It permit the biochemical and physiological reactions to proceed with maximal efficiencies.
- c. It enhances the overall fitness of the species.
- d. All of the above.

(ii) Thermoregulation and osmoregulation occur in all:

- a. birds and mammals
- b. reptiles and birds
- c. amphibians and reptiles
- d. fishes and amphibians

(iii) Evolutionary biologists believe that the 'success' of mammals is largely due to their ability to

- a. live in groups
- b. sense the danger and escape from it.
- c. maintain a constant body temperature.
- d. reproduce in large numbers

(iv) If the stressful conditions are localised or remain only for short period the organisms follow the following method to overcome the stressful environment. Choose the correct pair of method.

- a. Migrate and conform
- b. suspend and migrate
- c. Regulate and migrate
- d. suspend and regulate.

(v) If animal is unable to migrate, it avoids the stress by escaping in time by

- a. hibernation
- b. aestivation
- c. diapause
- d. all the above

16. Read the following and answer any *four* questions from 16(i) to 16(v) given below:

The overall ability of the host organism to fight the disease-causing organism conferred by our immune system, is called immunity. Immunity may be (i) innate immunity or (b) acquired immunity. A heavily bleeding and bruised road accident victim was brought to nursing home. The doctor immediately gave him an injection to protect him against a deadly disease.

(i) the disease against which the injection was given, is

- a. diphtheria
- b. tetanus
- c. whooping cough
- d. plague

(ii) The doctor injected into the victim

- a. preformed antibodies
- b. weakened pathogen
- c. acquired passive immunity
- d. autoimmunity

(iii) the type of immunity provided in this case is

- a. innate immunity
- b. acquired active immunity
- c. acquired passive immunity
- d. acquired antibody mediated immunity

(iv) Another disease for which also the same type of immunization is carried out include

- a. Rabies
- b. polio
- c. diphtheria
- d. both (a) and (c)

(vi) **Assertion:** The antibody-mediated immune response is also known as humoral immunity

Reason: The T-Imphocyte are responsible for cell-mediated immunity

- a. Both assertion and reason are true, and reason is the correct explanation of assertion.
- b. Both assertion and reason are true, but reason is not the correct explanation of assertion.
- c. Assertion is true but reason is false.
- d. Both assertion and reason are false.

SECTION B

17. What is amniocentesis? Justify the statutory ban on it.

18. (a) Who postulated an adapter molecule to link the genetic code and the amino acids? Name the adapter.

(b) Mention its function.

19. What are the low and high dose effects of cocaine? Name two plants containing same kind of product.

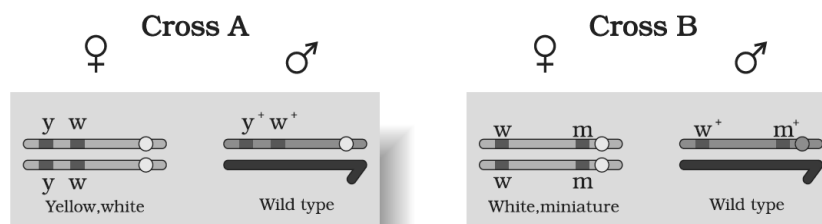
OR

Describe the function of 'anaerobic sludge digester' in a sewage treatment plant.

20. (a) Expand GEAC. Explain the role of GEAC in biotechnology.

21. List the two causes of biodiversity losses with one example of each.

22. Study the figure given below and answer the questions.



Identify in which of the crosses the strength of linkage between the genes is higher. Give reasons in support of your answer

23. What is the significance of *lac z* gene in biotechnology?

OR

Which microbe is called as 'Natural genetic engineer'? How it was made suitable for genetic engineering purpose.

24. Distinguish between codon and anticodon (any two).

25. Why do bacteria/ prokaryote have restriction enzymes, but not eukaryotes?

SECTION C

26. Name and distinguish between the two cells enclosed in a mature pollen grain of a angiosperm.

27. Name two disease each, which are transmitted in the following ways:

- a) Through contaminated food and water
- b) Through insect vectors
- c) Through droplet infection

28. Human blood character is a good example of multiple allelism and co-dominance, Justify.

29. Explain the mode of action of EcoRI.

OR

State the role of the following genes in the cloning vector pBR322 in *E. coli*.

- a) Ori
- b) Antibiotic-resistance genes
- c) rop gene.

30. Explain the process of making the hnRNA into fully functional mRNA in eukaryotes. Where does this process occur in the cell?

SECTION D

31. (a) Differentiate between spermatogenesis and oogenesis on the basis of:

- i) Time of initiation of the process
- ii) Site of completion of the process
- iii) Nature of meiotic division undergone by gamete mother cells

(b) Name the hormones and state their role involved in controlling spermatogenesis in human.

OR

(a) Draw the diagram of an angiospermic ovule and label the following parts in it: Funicle, Hilum, Micropyle, Chalaza, Nucellus, Embryo sac.

32. (a) What is an age pyramid?

(b) Explain with the help of illustration, the three types of age pyramids representing human population.

OR

(a) Explain 'rivet popper' hypothesis.

(b) How is genetic variation important in the plant *Rauwolfia* and Rice.

33. (a) What is the significance of RNA in cellular world.

(c) Explain chemical stability of DNA.

OR

Explain blood disorder

- (i) caused by gene present on autosomal chromosome.
- (ii) caused by gene present on X – chromosome.