

FIRST TERM EXAMINATION, 2024-25

CLASS XII

SUBJECT-BIOLOGY (044)

Max. Marks:70

Time-3 hours

General instructions:

All questions are compulsory. However, an internal choice is provided in 2,3, and 5 marker questions.

Section- 'A' consists of 14 Objective Type (including MCQs and Assertion-Reasoning) type questions of one mark each.

Section 'B' consists of 6 Short Answer (SA) type questions carrying 2 marks each.

Section 'C' consists of 7 Long Answer (LA-I) type-I questions carrying 3 marks each.

Section 'D' consists of 2 case-based questions carrying 4 marks each.

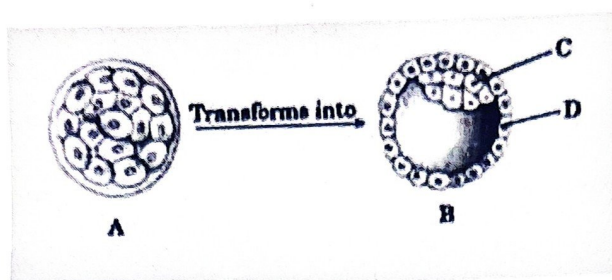
Section 'E' consists of 3 Long Answer (LA-II) type-II questions carrying 5 marks each.

SECTION -A

1. A bilobed ditheous anther has 500 microspore mother cells per microsporangium. How many male gametophytes can this anther produce?

- a) 10,000
- b) 25,000
- c) 20,000
- d) 8,000

2. Study the given diagram-



A is the embryonic stage that gets transformed into B, which in turn gets implanted in the endometrium in human females.

Identify A, B and its parts C and D

- a) A- Morula, B-blastomere, C- blastula D-inner cell mass
- b) A- blastula, B-gastrula, C- trophoblast, D-inner cell mass
- c) A-morula B- blastocyst C- stem cells D-trophoblast
- d) A- blastocyst B-trophoblast C-stem cells D-morula

3. Cu ions released from copper releasing intrauterine devices (IUDs)

- a) Prevent ovulation
- b) make uterus unsuitable for implantation
- c) decrease phagocytosis of sperms
- d) suppress sperm motility.

4. The base pairs of DNA double helix is given below. Select the suitable mRNA strand that derived from transcription is

3-ATTTCC-5

5-TAAAGG-3

- a) UAAAGG
- b) CUUCC
- c) GAAAGG
- d) CCUUUC

5. If the maternal grandfather of a boy is haemophilic, maternal grandmother is normal and father is normal then what are the chances that he could have haemophilia disease?

- a) 25 %
- b) 50 %
- c) 75%
- d) 0%

6. What were the main criteria taken under consideration for the experiment by Hershey and Chase?

- a) DNA contains phosphorus, protein contains sulphur
- b) Protein contains phosphorus, DNA contains sulphur
- c) Both DNA and protein contains phosphorus and not sulphur
- d) Both DNA and protein contains sulfur and not phosphorus.

7. Which of the following combination of chromosomes number represents the correct sex determination pattern in honey bee?

- a) Males=32, Females=16
- b) Males=16, Females=32
- c) Males=31, Females=32
- d) Females=32, Males=30

8. Which of the following is used as an atmospheric pollution indicator?

- a) Lepidoptera
- b) Lycopersicon
- c) Lichens
- d) Lycopodium

9. The free-living fungus *Trichoderma* can be used for:

- a) killing insects
- b)controlling butterfly caterpillars
- c) biological control of plant diseases
- d)producing antibiotics

10. The purpose of biological treatment of waste water is to

- a) Reduce BOD
- b) Increase BOD
- c) Reduce sedimentation
- d) Increase sedimentation.

11. Assertion: Besides curdling of milk, LAB also improve its nutritional quality by increasing vitamin-B12.

Reason: LAB, when present in human stomach, check disease causing microbes.

- 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.

12. Assertion: In Pigeon males are homogenetic and female are hetrogemetic.

Reason: In pigeons, males have ZZ sex chromosomes, and females have ZW sex chromosomes.

- 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.

13. Assertion : The DNA dependent DNA polymerases catalyses the polymerization reaction in $5' \rightarrow 3'$ direction.

Reason: The DNA polymerase enzymes can initiate the process of replication on their own.

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.

14. Assertion: Lactational amenorrhea is a natural method of contraception.

Reason: Ovulation does not take place during the period of intense lactation following child birth.

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

15. Write the differences between wind pollinated and insect pollinated flowers. Give an example of each. (1+1=2)
16. Given below are two statements. State whether each of them is true or false and justify, using examples. (a) All contraceptives have the added advantage of protection against sexually transmitted diseases. (b) Natural birth control methods have negligible side effects. (1+1=2)
17. Draw a schematic representation of dinucleotide. Label the following:
(a) The components of a nucleotide (b) 5th end (c) N-glycosidic linkage (d) Phosphodiester linkage. (0.5X4=2)

OR

- A DNA sequence consists of 35% cytosine nucleotides. What would be the percentage of adenine nucleotides in the same DNA sequence? Justify your answer. (1+1=2)
18. State two points of difference and two points of similarity between Klinefelter's syndrome and Turner's syndrome. (0.5X4=2)
19. Using a Punnett square, determine the genotype of the parents, if their child can have any of the four blood groups. (2)
20. Radha had just undergone a kidney transplant, a bioactive molecular drug is administered to oppose kidney rejection by the body. What is the bioactive molecule? Also name the microbe from which this is extracted? (1+1=2)

SECTION -C

21. Mention any four strategies adopted by flowering plants to prevent self-pollination. State one advantage and disadvantage of self-pollination. (2+1=3)
22. Meiotic arrest is a phenomenon noticed during oogenesis in human females where oocytes are arrested in the primary oocyte stage. (a) What is the chromosomal count of these primary oocytes? (b) How are these primary oocytes converted to ovum, represent with a diagram showing cross section of human ovary. (1+2=3)

23. Angiosperms undergo double fertilisation.

(1+2=3)

(a) What is double fertilisation and the product/s of double fertilisation? (b) If you are given a pea pod, how can you identify the product/s of double fertilisation in it?

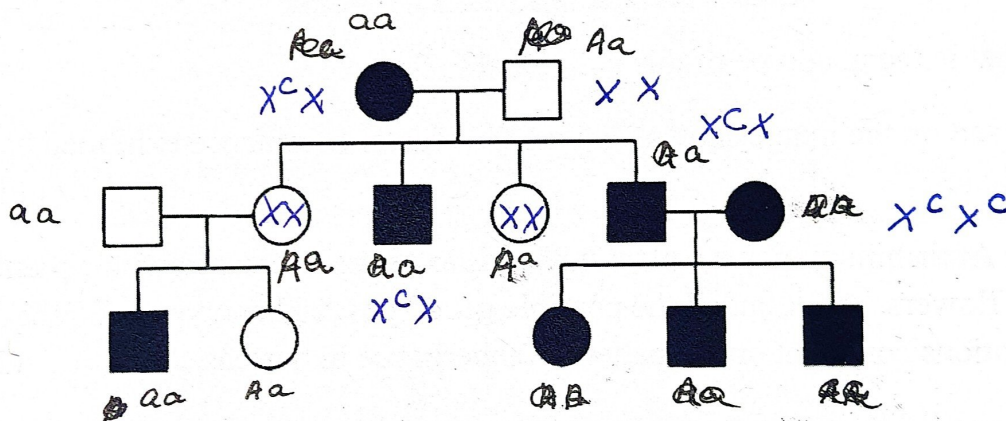
24. Name the techniques which are employed in following cases : (a) Transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce ova but can provide suitable environment for fertilisation and development.

(b) Embryo is formed in laboratory in which sperm is directly injected into ovum.

(c) Semen collected either from husband or a healthy donor is artificially introduced either into vagina or uterus.

(1+1+1=3)

25. Given below is the pedigree of a family for a trait.



a) Identify the mode of inheritance of the trait. Give a reason(s) to support your answer.

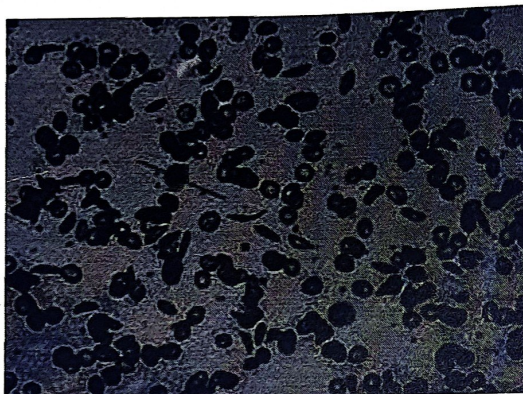
b) Choose the correct answer to complete the following sentence: Colour blindness is a sex-linked condition. However, a (heterozygous/homozygous) (male/female) will always have normal vision.

c) What are the genotypes of the affected and unaffected individuals? (1+1+1=3)

OR

Sickle cell anemia (allele a) is a disorder where the RBCs stretch out and become thin as opposed to the round normal (allele A) RBCs. A person who is homozygous for normal RBCs marries a person who is heterozygous for sickle cell RBCs.

(a) What is the probability of the off-springs to be homozygous for the sickle cell trait? Blood from one of the off-springs was checked and the microscopic image of its RBCs is shown below.



(b) What is the genotype of this individual?

(c) Based on the image shown, explain the type of dominance exhibited by the sickle cell allele? (1+1+1=3)

26. In *Antirrhinum majus* a plant with red flowers was crossed with a plant with white flowers. Work out all the possible genotypes & phenotypes of F₁ & F₂ generations comment on the pattern of inheritance in this case? (2+1=3)

27. A gas is liberated from biogas plant. Give the composition of this gas. Which type of bacterium is responsible for its production? What are the advantages of using it as a source of energy? (1+1+1=3)

SECTION -D

28. Read the paragraph carefully and answer the following questions (1 mark each): According to Hardy Weinberg principle, the allele frequencies in a population are stable and remain constant through generations. When the frequency differs from the expected values, the difference indicates the extent (direction) of evolutionary change. Disturbance in the genetic equilibrium or Hardy Weinberg equilibrium in a population can be interpreted as resulting in evolution.

(i) Which is correct formula of Hardy - Weinberg's law?

(a) $p^2 + pq + q^2 = 0$ (b) $p^2 + pq + q^2 = \text{infinity}$

(c) $p^2 + pq + q^2 = 1$ (d) $p^2 + 2pq + q^2 = 12$

(ii) What would lead to deviation from Hardy – Weinberg equilibrium ?

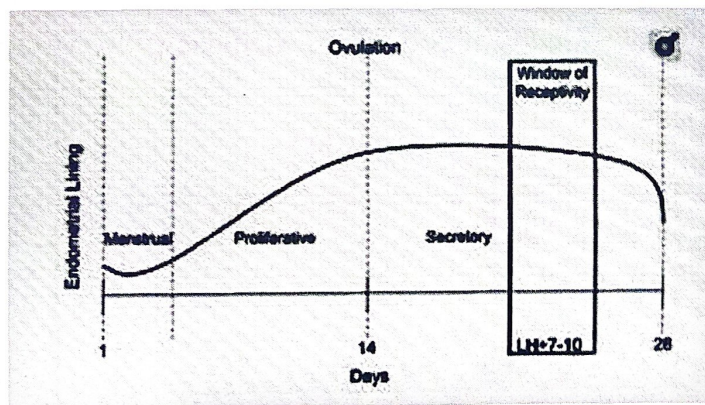
(iii) In a population of 1000 individuals, 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population is.

a) 0.4 (b) 0.5 (c) 0.6 size (d) 0.74

(iv) How random genetic drift in a population is caused.

29. Read the paragraph carefully and answer the following questionsn (1 mark each):

The basic biology of the menstrual cycle is a complex, coordinated sequence of events involving the hypothalamus, anterior pituitary, ovary, and endometrium. The menstrual cycle with all its complexities can be easily perturbed by environmental factors such as stress, extreme exercise, eating disorders, and obesity. For successful pregnancy to occur, the endometrium must be receptive, the blastocyst must come into contact with the endometrium, and the blastocyst must penetrate the decidua to access a blood supply



i. If mammalian ovum fails to get fertilized, which one of the following is unlikely?

(a) Corpus luteum will disintegrate.

(b) Progesterone secretion rapidly declines.

(c) Estrogen secretion increases.

(d) Primary follicle starts developing.

ii. A human female reaches menopause around the age of

(a) 50 years

(b) 15 years

(c) 70 years

(d) 25 years.

iii. In the event of pregnancy, the corpus luteum persists under the influence of

(a) LH

(b) FSH

(c) chorionic gonadotropin

(d) progesterone.

iv. What do we understand by receptivity of endometrium? What is the significance of this?

SECTION -E

30. i) What is the ploidy of central cell in unfertilized embryo sac. (1+1+3=5)

ii) What is polyembryony? Give an example.

iii) In fruits, what is formed from following parts :- a) Ovary wall b) Outer integument c) Inner integument d) zygote e) primary endosperm f) Nucellus

OR

Elaborate the process of implantation and enlist hormones regulating gestation process emphasizing source of secretion and their action, also discuss the changes in fetal development followed by events of ejaculation reflex. (1+2+2=5)

31. i) Explain the process of aminoacylation of tRNA. Mention its role in translation.
- ii) How do ribosome in the cells act as factories for protein synthesis, support your answer with a labeled diagram. (3+2=5)

OR

Discuss the process of transcription with labeled diagram of transcription unit and differentiate the process in prokaryotes with eukaryotes. (3+2=5)

32. What was proposed by Oparin and Haldane on origin of life? How did SL Miller's experiment support their proposal, explain with diagram. (2+3=5)

OR

- i). Enumerate the key concepts in the evolution theory of Darwin.
- ii). How is convergent evolution different from divergent evolution? explain with examples. (3+2=5)