KVS(DR)/2024/VG

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Half Yearly Examination - 2024-25

Class- XII

M.M. - 70

Subject- Biology (044)

Time- 3 Hrs

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has five sections and 33 questions.

(iii) **Section-A** has 16 questions of 1 mark each; **Section-B** has 5 questions of 2 marks each; **Section-** C has 7 questions of 3 marks each; **Section- D** has 2 case-based questions of 4 marks each; and **Section-E** has 3 questions of 5 marks each.

(iv) There is no overall choice. However, internal choices have been provided in some questions. A student has to attempt only one of the alternatives in such questions.

(v) Wherever necessary, neat and properly labelled diagrams should be drawn.

**Section-A**

1. The sporozoites that causes infection when a female Anopheles mosquito bites a person, are formed in :

(a) liver of the person

(b) RBCs of mosquito

(c) salivary glands of mosquito

(d) gut of mosquito

2. Given below are the pairs of contrasting traits in *Pisum sativum* as studied by Mendel. Select the incorrectly mentioned option from the table given below:

| | Character | Dominant | Recessive |
|---|---|---|---|
| (a) | Flower colour | Violet | White |
| (b) | Pod shape | Inflated | Constricted |
| (C) | Stem height | Tall | Dwarf |
| (d) | Flower position | Terminal | Axial |

3. Which of the following is not a source of variation

(a)Recombination

(b) Genetic Drift

(c) Migration

(d) Adaptations

4. Identify the option that does not exhibit a parasitic relationship.

(a) Head lice in humans

(b) Cuscuta on a mango tree

(c) Female Anopheles

(d) Ticks on dogs

5. Identify the incorrect statements for Human Genome Project.

(i) Total number of genes are 40,000.

(ii) Human Genome contains 3164.7 million nucleotide base.

(iii) Functions of only 20% of the discovered genes are unknown.

(iv) Repeated sequences make up very large portion of the human genome.

(a) (i) and (iii)

b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

30. Read the text carefully and answer the questions:

The following is the illustration of the sequence of ovarian events (A-I) in a humans female.


(i) Identify the figure that illustrates ovulation and mention the stage of oogenesis it represents.
(ii) Name the ovarian hormone and the pituitary hormone that have caused the above mentioned event.
(iii) Explain the changes that occur in the uterus simultaneously in anticipation.
**OR**
Write the difference between C and H.
(iv) Name the fluid filled space in E and hormone secreted by G.

**For visually challenged students (in lieu of Q30)**

(a) Highlight one aspect by which meiosis during oogenesis differs from regular meiosis.
(b) Name two hormones that are common to spermatogenesis and oogenesis.
(c) State the function of hormone identified in (b) in both human male and female.

**Section E**

31. (a) State Hardy-Weinberg equilibrium.

(b). Explain any four factors affecting Hardy-Weinberg equilibrium.

**OR**

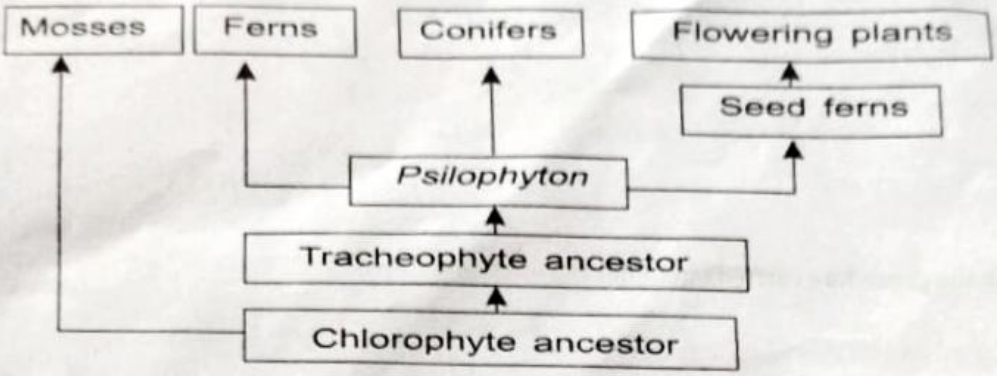
Consider a hypothetical situation: A species of butterflies exhibit a range of wing colours. Butterflies with extremely bright wing colours attract predators easily as compared to the ones with very dull wing colours. Butterflies with very dull wing colours fail to attract mates as compared to the ones with bright wing colours. Butterflies with intermediate wing colours have the best chance of both avoiding predators and finding mates.

(a) Which type of natural selection does this phenomenon exemplify? Justify your answer.

(b) A few years later, the rise in industries and pollution, causes the habitat to become darker. How would it affect the survival of the different kinds of butterflies belonging to this species? Which type of natural selection does this phenomenon exemplify?

(c) In a specific region where this species is prevalent, a mutation in its population leads to butterflies with a shorter wing colour. Highlight the possible effect on the long-term survivability of this variant be?

26. Study the schematic representation of evolutionary history of plant forms given below and mention:




(a) The plant form Ferns and Conifers are most related to.
(b) The nearest ancestors of flowering plants
(c) The most primitive group of plants.
(d) Common ancestry of Psilophyton are
(e) The common ancestors of Psilophyton and seed ferns.
(f) The common ancestors of mosses and tracheophytes.

**For visually challenged students (in lieu of Q26)**

Write one characteristic of any fossil of human evolution.

27. With the help of a storyboard or a flowchart only, explain all the stages of how human insulin is produced through rDNA technology.

28. Compare in any three ways the chromosomal theory of inheritance as proposed by Sutton and Boveri; with that of experimental results on pea plant presented by Mendel.

**Section D**

29. Read the text carefully and answer the questions:

Transgenic animals can serve as factories that in some cases, may produce large amounts of proteins more efficiently. Transgenic mice have been engineered to express human antibodies by introducing a large segment of human DNA encoding human immunoglobulin genes. In transgenic large animals such as cows or sheep proteins of pharmaceutical value can be produced in large quantities in milk which is later purified. Transgenes can be used to alter many phenotypic properties including growth rate, fat composition, milk production, hair texture, etc.

(i) Name the first transgenic cow. Also mention its importance for humans.
(ii) Write any two advantages of the production of transgenic animals?
(iii) Why is mouse the most preferred animal for studies on gene transfer?

OR

Assertion (A): Transgenic mice have been engineered to express human antibodies.
Reason (R): Large segments of human DNA encoding human immunoglobulin have been transferred to mice.

a) Both A and R are true and R is the correct explanation of A.

(b) Explain the procedure carried out under the following steps:

(i) Matrix used and its role

(ii) Staining and extraction of the DNA

**For visually challenged students (in lieu of Q23)**

Describe the process of DNA fingerprinting.

24. (a) How are primary and secondary immune responses carried out by B-lymphocytes and T-lymphocytes respectively in our body?

(b) Enlist two differences between primary response and secondary response, produced by our body in response to a pathogen.

25. A biologist sees the following cells in a cross- section of the seminiferous tubule and its surrounding tissues and counts the number of various kinds of cells.

Spermatozoa, Spermatid, Primary spermatocyte, Secondary spermatocyte, Leydig cells, Sertoli cells, Spermatogonium.

From these cells, identify the cells:
(a) that are diploid.
(b) that produce hormones and their names.

C). Identify the cell which produces factors and mention its function.

**OR**

(a) Expand the abbreviations given below, used for the different modes of assisted reproductive technologies:

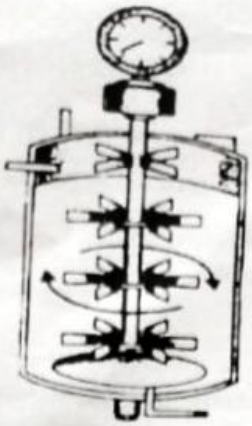
(1) ZIFT

(ii) ICSI

(iii) IUT

(iv) GIFT

(b) Which one of them cannot be considered as a procedure of IVF? Give reasons in support of your answer.



**For visually challenged students (in lieu of Q20)**

Describe the process of any one bioreactor.

21. Match the microbes listed under column A with the products mentioned under column B

| COLUMN A | COLUMN B |
|---|---|
| (H)*Penicilium notatum* | (i) Statin |
| (I)*Trichoderma polysporum* | (ii) ethanol |
| (J) *Monascus purpureus* | (iii)antibiotic |
| (K)*Saccharomyces cerevisiae* | (iv)Cyclosporin -A |

**OR**

(a) Write the first step the primary effluent undergoes when it enters the secondary treatment plant and state the purpose.

(b) What is the level of BOD indicative of, in the secondary treatment plant? Mention its significance.

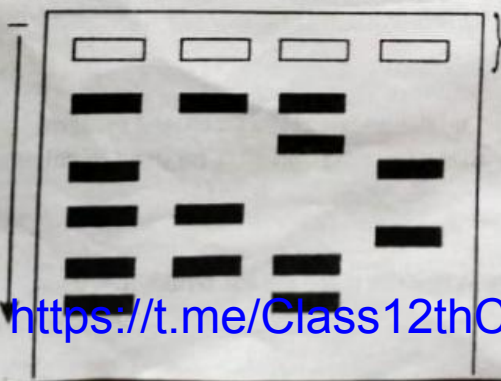
**Section C**

22. A segment of DNA 3' GCCAGGGGGATG 5' codes for an oligopeptide: Arginine-Serine-Proline-Tyrosine

(a) What is the base sequence in the RNA transcript?
(b) If the first adenine in the DNA is substituted by guanine, what will be the :
(i) sequence of amino acids in the new oligopeptide?

(ii) anticodons on tRNAs for these amino acids?

23. A restriction enzyme digests a certain DNA into fragments. The fragments are subjected to a technique, the result obtained is in the illustration given below. Observe and answer the questions that follow.




(a) Name the technique and its purpose.

obtained when an injection of antitoxin in tetanus is given?

(a) Active immunity (b) Humoral immunity

(c) Passive immunity (d) All of these

12. In prokaryotes like *E. coli*, the DNA in the nucleoid region is organised as:

(a) negatively charged DNA wrapped around histone.
(b) densely packed chromatin with NHC proteins.
(c) large loops held by the proteins.
(d) many repeating units of nucleosomes.

**Question No. 13 to 16 consist of two statements - Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:**

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true and R is not the correct explanation of A.

(c) A is true but R is false.

(d) A is false but R is true.

13. **Assertion** : Determining the sex of an unborn child followed by MTP is an illegal practice.

**Reason** : Aminocentesis is a practice to test the presence of genetic disorders also.

14. **Assertion**: Genetic make up serves as the primary factor in shaping the phenotype of a species and not vice versa.

**Reason** : Adaptation involves the phenotypes interaction with the environment , leading to changes in genetic makeup over generations.

15. **Assertion** : The Mediterranean Orchids, Ophrys uses sexual deceit to get pollinated by a species of bee.

**Reason** : The female changes its colour depending on the temperature of that area.

16. **Assertion** : When DNA of two different sources are cut by the same restriction enzymes , the resultant fragments have different kinds of 'sticky ends'.

**Reason**: These can be joined end -to- end using DNA Ligases.

## Section B

17. What is colostrum? Why it is important to feed the new born babies on colostrums?

18. Give an example of a gene responsible for multiple phenotypic expressions. What are such genes called? State the cause that is responsible for such an effect.

19. Population density is calculated by the following formula:

$$N_{t+1}=N_t+[(B+I)-(D+E)]$$

Imagine a population of fish in an artificial lake which acts as a closed system.
(a) Which quantity or quantities of the above formula will NOT be used in calculating the population of fish?
(b) Give reason for (a).

20. Name the type of bioreactor shown. Write the purpose for which it is used.

(b) (ii) and (iv)

(c) (i) and (ii)

(d) (ii) and (iii)

6. Match column I with column II and select the correct option from the codes given below.

| | Column I | | Column II |
|---|---|---|---|
| A | Fertilization | (i) | Morula |
| B | Cleavage | (ii) | Vagina |
| C | Blastocyst | (iii) | Ampulla of oviduct |
| D | Parturition | (iv) | Uterine wall |

(a) A-(iv), B-(i), C-(ii), D-(iii)

(b) A-(ii), B-(i), C-(iv), D-(iii)

(c) A-(ii), B-(i), C-(iii), D-(iv)

(d) A-(iii), B-(i), C-(iv), D-(ii)

7. Interaction between clown fish living among the stinging tentacles of sea anemone is an example of

(a) Amensalism

(b) Parasitism

(c) Mutualism

(d) Commensalism

8. The correct sequence of hormone secretion from beginning of menstruation is-

(a) FSH, progesterone, estrogen

(b) Estrogen, FSH, progesterone

(c) FSH, estrogen, progesterone.

(d) Estrogen, progesterone, FSH.

9. Select the correct option regarding a disease with its causal organism where haemozoin is released by the rupture of RBCs.

(a) Amoebiasis, *Plasmodium vivax*

(b) Common cold, Rhinovirus

(c) Malaria, *Plasmodium falciparum*

(d) Pneumonia, *Haemophilus influenzae*

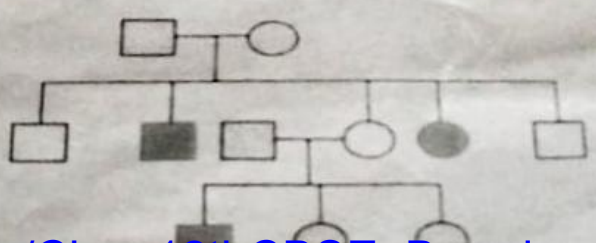
10. Study the pedigree chart of a family showing the inheritance pattern of a certain disorder. Select the option that correctly identifies the nature of the trait depicted in the pedigree chart

(a) Dominant X-linked

(b) Recessive X-linked

(c) Autosomal dominant

(d) Autosomal recessive





11. Identify the type of immunity

32. (a) What do the terms menarche and menopause mean.

(b) Mention the role of gonadotropins in menstrual cycle.

(c) On what day of the menstrual cycle do the gonadotropins reach a peak? What is the event associated with it?

**OR**

Angiosperm flowers shows out breeding devices.

(a) Describe the characteristic features of each one of them out breeding devices.

(b) State which one of these flowers promotes inbreeding and outbreeding.

33. The use of chemical fertilisers to meet the ever- increasing demand of agricultural produce to feed the ever-increasing human population, has contributed significantly to environmental pollution. Now that we have realised the problems associated with the overuse of chemical fertilisers, there is large pressure to switch over to organic farming; there is a need these days to push for the use of biofertilisers. Currently, in our country, a number of biofertilisers are available in the market and farmers do use them regularly in their fields.

(a) What are biofertilisers?

(b) Name (i) a bacterium and (ii) a fungus that are symbionts and act as biofertilisers.

(c) Name two cyanobacteria that are nitrogen fixers.

(d) Name the fungal genus that often forms mycorrhizal association with higher plants. Mention any two advantages, the mycorrhizal association provides to the plants.

**OR**

(a) Name the microbes that help production of the following products commercially:

(i) Statin

(ii) Citric acid

(iii) Penicillin

(iv) Butyric acid

(b) How do organic farmers control pests? Give two examples

(c) State the difference in their approach from that of conventional pest control methods.

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