KCM WORLD SCHOOL, PALWAL

PRE BOARD EXAMINATION - 1 (SESSION: 2024-25)

CLASS – XII SUBJECT –BIOLOGY – (CODE-044)

(SET-A)

Time Allowed – 3hrs M.M. = 70

General Instructions:

1. All questions are compulsory.
2. The question paper has five sections and 33 questions. All questions are compulsory.
3. Section–A has 16 questions of 1 mark each.
4. Section–B has 5 questions of 2 marks each.
5. Section– C has 7 questions of 3 marks each
6. Section– D has 2 case-based questions of 4 marks each.
7. Section–E has 3 questions of 5 marks each.
8. 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.
9. Wherever necessary, neat and properly labeled diagrams should be drawn.

Name: ..... Class .....

SECTION – [A]

1. Which of the following are the correct reasons for Rheumatoid arthritis?
   (i) Lymphocytes become more active
   (ii) Body attacks self cells
   (iii) More antibodies are produced in the body
   (iv) The ability to differentiate pathogens or foreign molecules from self cells is lost
   Choose the correct answer from the options given below:
   (a) (i) and (ii) (b) (iii) and (iv) (c) (i) and (iii) (d) (ii) and (iv)

2. The organism which reproduces only once in its life time, is
   (a) Pacific Salmon fish (b) Pelagic fishes in sea
   (c) Orangutan (d) Chimpanzee

3. 'Heat shock' method in bacterial transformation is to facilitate
   (a) The expression of antibiotic-resistance gene.
   (b) The uptake of DNA through the transport proteins of the membrane.
   (c) The uptake of DNA through the transient pores in the bacterial cell wall.
   (d) The binding of DNA to the bacterial cell wall

4. Match Column I with the Column II and select the correct option:

Column I	Column II
A. Hormone-releasing IUD	1. Sterilisation in males
B. Oral contraceptive	2. Suppression of gonadotropins
C. Vasectomy	3. Progestasert
D. Lactational amenorrhoea	4. Implant under the skin
	5. Suppression of ovulation and implantation

   (a) A-3, B-5, C-1, D-2 (b) A-5, B-4, C-1, D-2
   (c) A-2, B-4, C-1, D-3 (d) A-4, B-5 C-1, D-2

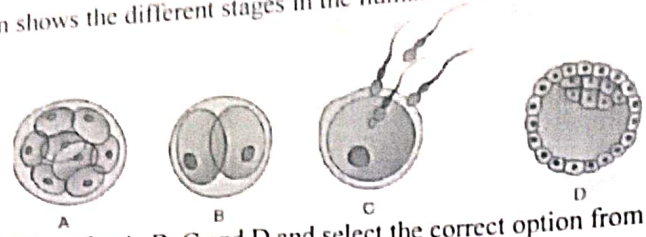
5. Match the items in Column I with those in Column II and select the correct option.

Column I	Column II
A. Biological control	1. *Methanobacterium*
B. Ladybird beetle	2. *Monascus purpureus*
C. Mycorrhizae	3. *Trichoderma sp.*
D. Activated sludge	4. Aphids
	5. *Glomus*

   (a) A-3, B-4, C-5, D-1 (b) A-4, B-3, C-5, D-1
   (c) A-5, B-4, C-2, D-3 (d) A-5, B-3, C-2, D-1

6. The process of mineralisation during decomposition by microbes results in the release of
   (a) inorganic nutrients from humus.
   (b) inorganic nutrients and formation of humus from detritus.
   (c) organic nutrients from humus.
   (d) both organic and inorganic nutrients from detritus.

7. The following diagram shows the different stages in the human embryonic development.



Identify the correct labellings for A, B, C and D and select the correct option from the table given below:

	A	B	C	D
(a)	Blastocyst	Cleavage	Fertilisation	Morula
(b)	Morula	Fertilisation	Cleavage	Blastocyst
(c)	Morula	Cleavage	Fertilisation	Blastocyst
(d)	Blastula	Fertilisation	Cleavage	Morula

8. In a nucleotide, a phosphoester linkage is formed between the phosphate group and the
(a) OH group at 3' C of a nucleoside (b) OH group at 5' C of a nucleoside
(c) H group at 3' C of a nucleoside (d) H group at 5' C of a nucleoside

9. In a population of 1000 individuals, 360 have the genotype AA, 480 have the genotype Aa and 160 have the genotype aa; hence, the frequency of allele A in the population, is
(a) 0.4 (b) 0.5 (c) 0.6 (d) 0.8

10. Interferons formed by our body during a viral infection, are a part of
(a) physiological barriers (b) cellular barriers
(c) physical barriers (d) cytokine barriers

11. Amensalism is an interspecific interaction between two species, where
(a) one species is harmed and the other is benefitted.
(b) one species is affected (harmed) and the other is unaffected (neutral).
(c) one species is benefitted and the other is unaffected (neutral).
(d) both the species are harmed (affected).

12. Which one of the following is not a major characteristic feature of a biodiversity hotspot?
(a) High species-richness (b) Destruction of habitat
(c) Abundance of endemic species (d) Large number of exotic species

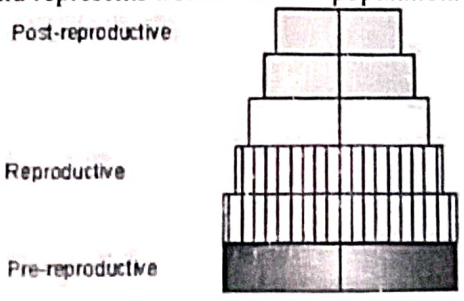
Question No. 13 to 16 consist of two statements – Assertion (A) and Reason (R). Answer these questions selecting the appropriate option given below:

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:** Morgan in his experiments with Drosophila found that the genes for white eyes and miniature wings showed 37.2 per cent recombination, whereas the genes for white eyes and yellow body showed 13 per cent recombination.
Reason: The frequency of recombination is directly proportional to the physical distance between the two genes present on the same chromosome.

14. **Assertion:** A patient of ADA-deficiency requires periodic or repeated infusion of genetically engineered lymphocytes with normal gene for ADA.
Reason: Lymphocytes are not immortal, but have a life span.

15. **Assertion:** The given age pyramid represents a stable human population.



Reason: The number of individuals in the pre-reproductive phase is nearly the same as that in the reproductive phase.

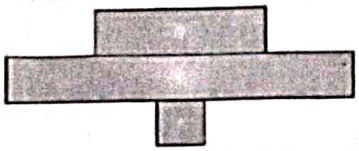
16. **Assertion:** In angiosperms, the development of embryo sac or the female gametophyte, is described as monosporic.
Reason: In angiosperms, there is a single female gametophyte in an ovule.

SECTION – [B]

17. Give reason for each of the following:
(a) HIV is a retrovirus and has no DNA; but, the infected host cells show viral DNA.
(b) Indiscriminate use of X-rays in the diagnostic practices should be avoided.

OR

Mention the function of ovary in the human body. Name the two different types of cells present in it.

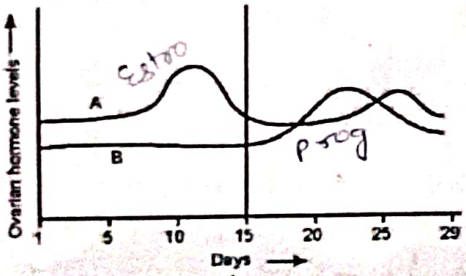
18. 

Give an instance, where such a type of an ecological pyramid appears and name the organisms in each of the three tiers in the example, you have cited.

OR

Explain the factors that regulate the process of decomposition of detritus.

19. Read the graph given below and answer the questions that follow:



(a) Name the hormones A and B shown in the graph.
(b) Why does the hormone A peak before the hormone B?

20. A recombinant vector with a gene of interest inserted within the gene of β-galactosidase enzyme is introduced into a bacterium. Explain the method that would help in selection of recombinant colonies from non-recombinant ones.

21. Differentiate between "ZZ" and 'XY" types of sex determination in animals.

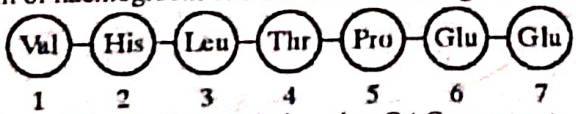
OR

(a) Write the genotypes of:
(i) an individual who is a carrier of sickle-cell anaemia gene, but apparently unaffected, and
(ii) an individual affected with the disease.
(b) Why do normal red blood cells become elongated sickle-shaped structure in a person suffering from sickle-cell anaemia?

SECTION – [C]

22. If the meiocyte of a maize plant contains 20 chromosomes, write the number of chromosomes in the endosperm and embryo of the maize grain and give reasons in support of your answer.

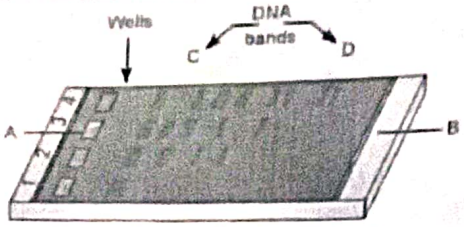
23. A relevant portion of β-chain of haemoglobin of a normal human is given below:



The codon for the sixth amino acid is GAG. The sixth codon GAG mutates to GAA as a result of mutation 'A' and to GUG as a result of mutation 'B'. Haemoglobin structure did not change as a result of mutation 'A', whereas haemoglobin structure changed because of mutation 'B', leading to sickle-shaped RBCs.
(a) Explain giving reasons, how mutation 'B' could change the haemoglobin structure, but not mutation 'A'
(b) Why do the RBCs become sickle-shaped due to mutation 'B'?

24. (a) List the two main propositions of Oparin and Haldane.
(b) Write the name of the primate that
(i) lived 2 mya in East African grassland.
(ii) was ape-like and lived 15 mya.

25. Study the diagram given below and answer the following questions:



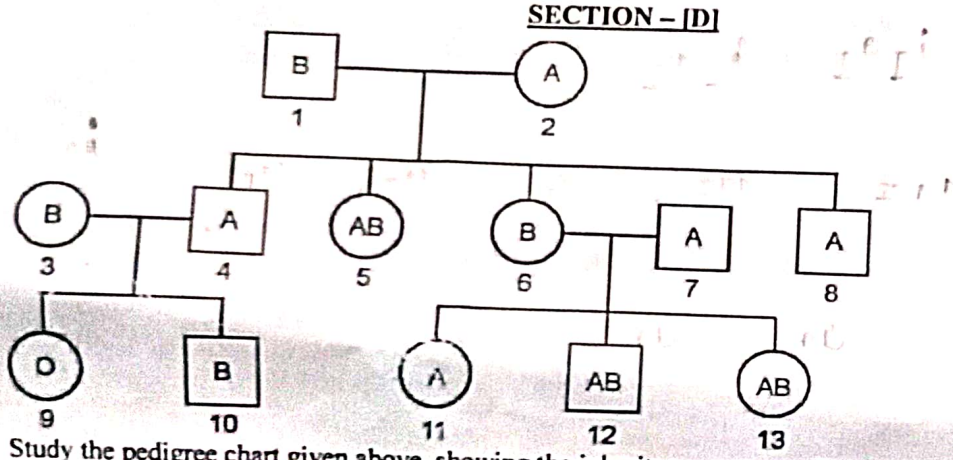
(a) Give reason for the different positions taken up by the DNA fragments in the gel.
(b) How can the separated DNA fragments be visualised?
(c) Why do the DNA fragments move towards the anode end?

26. Draw the diagram of a human sperm. Label only those parts along with their functions that assist the sperm to reach and gain entry into the female gamete.

27. (a) List the events that reduce the BOD of primary effluent during sewage treatment.
(b) Mention the role of cyanobacteria as biofertilisers.

28. Many plant and animal species are on the verge of their extinction because of loss of forest land due to the indiscriminate activities of humans. Explain how ex-situ methods can protect such threatened species from getting extinct.

29. **SECTION – [D]**



Study the pedigree chart given above, showing the inheritance pattern of blood groups in a family and answer the following questions:
(a) Give the possible genotypes of the individuals 1 and 2.
(b) Name the antigen present on the plasma membrane of RBCs in the individuals 6 and 9, respectively.
Attempt either subpart (c) or (d).
(c) Write the genotype and the antigen(s) present on the RBCs of the individual 5. Explain the pattern of inheritance responsible for this phenotype.

OR

(d) How is the pattern of inheritance of flower colour in Pisum different from the inheritance pattern of human blood group character?

30. The overall ability of the host to fight the disease-causing organisms (pathogens) conferred by the immune system, is called immunity. Immunity is of two types –
(i) Innate immunity and
(ii) Acquired immunity.
Innate immunity is the non-specific type of defense, which is present right from the time of birth. This is accomplished by providing different types of barriers to the entry of pathogens or their action in the body. The four types of barriers of innate immunity include physical, physiological, cellular and cytokine barriers.
(a) Name a physical barrier of innate immunity other than skin.
(b) Give two examples of physiological barriers.
Attempt either subpart (c) or (d).
(c) How do the virus-infected cells provide protection to other non-infected healthy cells from viral infection? What type of barrier does it form?

OR

(d) Name the type of barrier of the innate immunity, the macrophages belong to. How do they function as a barrier?

SECTION – [E]

31. (a) In the medium, where E.coli was growing, lactose was added, which induced the lac operon. Then, why does *lac* operon shut down sometime after addition of lactose in the medium?
(b) Forensic department was given three blood samples. Write the steps of the procedure carried out to get the DNA-fingerprinting done for the above samples.

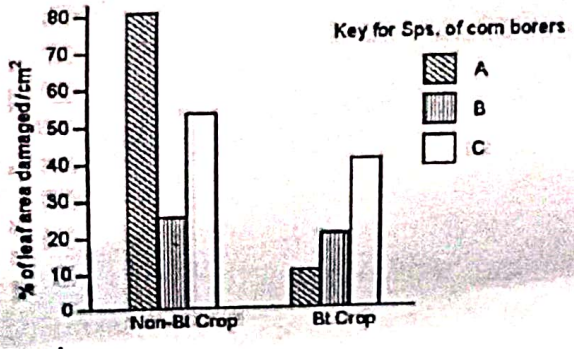
OR

(a) Write any six salient features of the human genome as shown from the Human Genome Project.
(b) 'DNA replication is continuous and discontinuous on the two stands within the replication fork'. Give reasons.

32. Answer the following questions based on the tools and the processes involved in rDNA technology:
(a) Why are plasmids and bacteriophages used most often as vectors in rDNA technology?
(b) Describe one process each, to introduce the desired gene/rDNA into (i) plant cells and (ii) animal cells, respectively.
(c) Name the process used for the amplification of the desired gene. Name the polymerase enzyme, its source organism and its importance in the process mentioned.

OR

In an experimental field study, three different species of corn borers namely 'A', 'B' and 'C were collected and independently fed on non-Bt corn plants and Bt corn plants separately. The extent of damage caused to the leaf area of the plants was observed and presented as bar graph given alongside:



(a) Identify the species of corn borer
(i) that is most successfully controlled in the Bt corn and
(ii) that has the least impact of the Bt toxin.
(b) Name the source organism and the gene isolated from it to produce the Bt corn plants.
(c) What would be your advice as a student of biology, to the farmers cultivating the corn plants in the area infested with species B of corn borer. Why?
(d) Mention any four advantages of genetically modified crops.

33. (a) Name in proper sequence, the four phases in the menstrual cycle of a human female.
(b) How long does the menstrual phase last in a menstrual cycle?
(c) When do the hormones estrogen and progesterone reach their peak levels, respectively, in the menstrual cycle? Give reasons.
(d) Define ovulation.

OR

What is oogenesis? Give a brief account of oogenesis till the formation of ootid (ovom).