विद्या सर्वार्थि साधिका

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PRE BOARD EXAMINATION

Class: XII

Subject: Biology MM: 70

Date: 20-01-2023 Time: 3Hrs

General Instructions:

(i) All questions are compulsory.

(ii) The question paper has five sections with 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. Wherever necessary, neat and properly labelled diagrams should be drawn.

SECTION A

1 The test tube programme employs which one of the following techniques: (1)

(A) ICSI (B) IUI (C) GIFT (D) ZIFT

2 Choose the option that are true for a typical female gametophyte of a flowering plant: (1)

(i) It is 8 nucleated and 7 celled at maturity

(ii) It is free nuclear during development

(iii) It is situated inside the integument but outside the nucleus

(iv) It has an egg apparatus situated at the chalazal end

(A) (i) and (iv) (B) (ii) and (iii) (C) (i) and (ii) (D) (ii) and (iv)

3 Calculate the total number of thymine bases present in the double stranded DNA if it transcribes a mRNA which reads as follows: 5' – AUGCAUCAUGCAAUCAGG - 3' (1)

(A) 10 (B) 5 (C) 15 (D) 20

4 Match the Scientists listed under column A with their contribution under column B (1)

Column A	Column B
(i) Darwin	(M) Abiogenesis
(ii) Oparin	(N) Biogenetic law
(iii) Haeckel	(O) Use and disuse theory
(iv) Lamarck	(P) Natural selection theory

(A) (i) – (M); (ii) – (P) ; (iii) - (O); (iv) – (N)

(B) (i) – (P); (ii) – (M) ; (iii) - (N) ;(iv) – (O)

(C) (i) – (P); (ii) – (N) ; (iii) - (M) ;(iv) – (O)

(D) (i) – (M); (ii) – (N) ; (iii) - (O) ;(iv) – (P)

5 T- lymphocytes are produced in _____. (1)

(A) Bone marrow (B) Spleen (C) Pancreas (D) Thymus

6 Which one of the following groups includes all sexually transmitted disease? (1)

(A) AIDS, Syphilis, Cholera

(B) HIV, Anthrax, Trichomoniasis

(C) Gonorrhoea, Hepatitis-B, Chlamydiasis

(D) Hepatitis-B, Haemophilia, AIDS

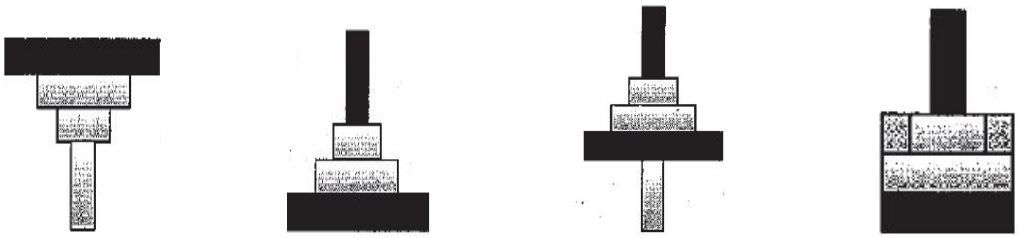
7 The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does it indicate? (1)

(A) Plant mature and die at the end of rainy season
(B) Its population curve is J shaped
(C) Population of its predators increase enormously
(D) S shaped growth of this insect

8 Cry 1 endotoxins obtained from *Bacillus thuringienesis*are effective against _____. (1)

(A) Nematodes (B) Boll worms (C) Pupae (D) Dragon flies

9 Which of the following representation shows the pyramid of numbers in a forest ecosystem? (1)



(A) (B) (C) (D)

10 Animals have the innate ability to escape from predation. Examples for the same are given below. Select the incorrect example. (1)

(A) colour changes in chameleon
(B) enlargement of body size by swallowing air in puffer fish
(C) poison fangs in snakes
(D) melanism in moths

11 The sequence of communities of primary succession in water is _____. (1)

(A) phytoplankton, sedges, free-floating hydrophytes, rooted hydrophytes, grasses and trees.
(B) phytoplankton, free-floating hydrophytes, rooted hydrophytes, sedges, grasses and trees.
(C) phytoplankton, sedges, reed swamps, free-floating hydrophytes, rooted hydrophytes, grasses and trees.
(D) phytoplankton, rooted submerged hydrophytes free-floating hydrophytes, reed swamps, sedges, grasses and trees.

12 Which one of the following is related to *ex-situ* conservation of threatened animal and plants? (1)

(A) Biodiversity hotspots (B) Amazon rainforest
(C) Himalayan region (D) Wildlife safari parks

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 (A): In apomixis, plants of new genetic sequence are produced. (1)
Reason (R): In apomixis, two individuals of same genetic sequence meet.

14 Assertion (A): Sickle cell anaemia is an autosomal recessive trait caused by point mutation. (1)
Reason (R): In sickle cell anaemia, mutation involves substitution of glutamic acid by valine.

15 Assertion (A): Nitrogen fixing bacteria in legume nodules survive in oxygen-depleted cells of nodules. (1)
Reason (R): Leghaemoglobin completely removes oxygen from the cells of the nodules.

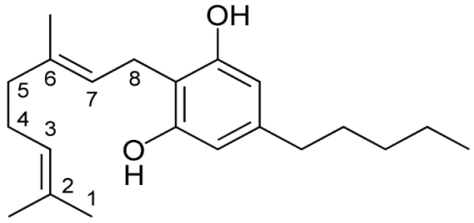
16 Assertion (A): RNA was the first genetic material. (1)
Reason (R): DNA has evolved from RNA by chemical combinations.

SECTION B

17 (a) What is parturition? (2)
(b) Which hormone is involved in it?

18 Flowers of garden pea are bisexual and self-pollinated. Therefore, it is difficult to perform hybridisation experiment by crossing a particular pistil with the specific pollen grains. How Mendel made it possible in his monohybrid, dihybrid and trihybrid crosses? (2)

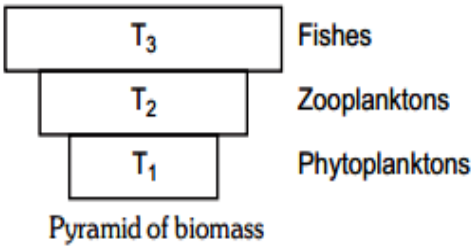
19 The outline structure of a drug is given below: (2)



(a) Which group of drugs does this represent?
(b) Name the organ which is affected by consumption of these drugs.

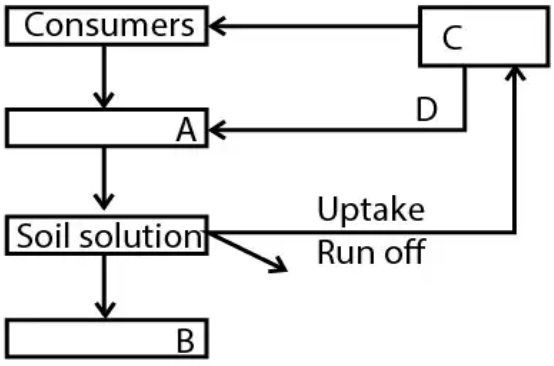
20 (a) Name any two non-genetic RNA. (2)
(b) Write any one difference between prokaryotic RNA and eukaryotic RNA.

21 Given below is the figure depicting pyramid of biomass in aquatic ecosystem. Observe the figures carefully and comment on it. (2)



OR

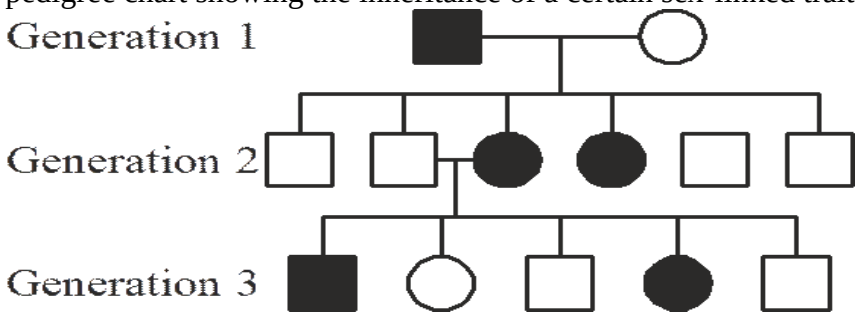
Phosphorus is an essential nutrient found in the macromolecules of humans and other organisms, including DNA. A simplified model of phosphorus cycling in a terrestrial ecosystem is given.



Observe the model and replace A, B, C and D with appropriate words.

SECTION C

22 Given below is a pedigree chart showing the inheritance of a certain sex-linked trait in humans. (3)



(a) Is the trait autosomal or sex-linked trait?
(b) Is the trait dominant or recessive?
(c) Write the genotypes of affected individuals in generation 3.

23 Explain the process of pollination in *Vallisneria.* How is it different in water-lily, which is also an aquatic plant? (3)

24 During a train accident, a large number of passengers were severely burnt beyond recognition. Suggest and describe a modern scientific technique that can help hand over the dead to their relatives. (3)

25 Branching descent and natural evolution are the two key concepts of Darwinian theory of evolution. Explain each concept with the help of a suitable example. (3)

26 Give scientific reasons for the following statements: (3)
(a) Neutrophils and macrophages are called soldiers and scavengers of the animal body.
(b) Persistent use of corticosteroids is harmful.
(c) Colostrum provides passive immunity to new born babies.

OR

(a) How and at what stage does plasmodium enter into a human body?
(b) Represent the stages of asexual reproduction in the life cycle of plasmodium parasite in infected human with the help of a flow chart.

27 Recombinant DNA technology involves various steps in specific sequence. Isolation of DNA is one of the major steps in this technology. Explain how DNA can be extracted from bacterial cell and plant tissues. (3)

28 (a) Ecological succession will be faster in a forest devastated by fire than on a bare rock. Explain why? (3)
(b) Which one of the following animals may occupy more than one trophic level in the same ecosystem at the same time? Give reasons.
(i) Sparrow (ii) Goat (iii) frog (iv) Lion

SECTION D

Question No 29 and 30 are case based questions. Each question has subparts with internal choice in one subpart.

29 Read the following passage and answer the questions given below: (4)

Alcohols are important industrial solvents. Ethanol, methanol, propanol and butanol are produced commercially by fermentation activity of some fungi, majorly yeasts. During fermentation, yeast cells convert cereal derived sugars into ethanol and CO_2. Yeast cannot grow in very strong sugar solution. Microbes can be easily grown in laboratories or at industrial scale for research and production of various useful products. For industrial-scale production, microorganisms are grown in fermenters. Many alcoholic beverages, antibiotics and chemicals are produced for commercial purposes.

(a) Which microbe is widely used in bakery industry?

(b) What is BOD? What does BOD value indicate?

(c) Mention a product of human welfare obtained with the help of each one of the following microbes.
(i) *Propionibacterium shermanii* (ii) *Aspergillus niger*

OR

(c) Name two groups of organisms which constitute 'flocs'.

30 Read the following passage and answer the questions given below: (4)

Interaction of biotic and abiotic components results in a physical structure that is characteristic for each type of ecosystem. For example, trees occupy top vertical strata or layer of a forest, shrubs the second and herbs and grasses occupy the bottom layers. The components of the ecosystem are seen to function as a unit when you consider the following aspects:

(i) Productivity; (ii) Decomposition; (iii) Energy flow; and (iv) Nutrient cycling.

(a) Define the term 'Stratification'. List the strata of an aquatic ecosystem.

(b) Which law explains the energy flow in an ecosystem?

(c) How is Net Primary Productivity calculated?

OR

List decomposers that are essential for functioning of an ecosystem.

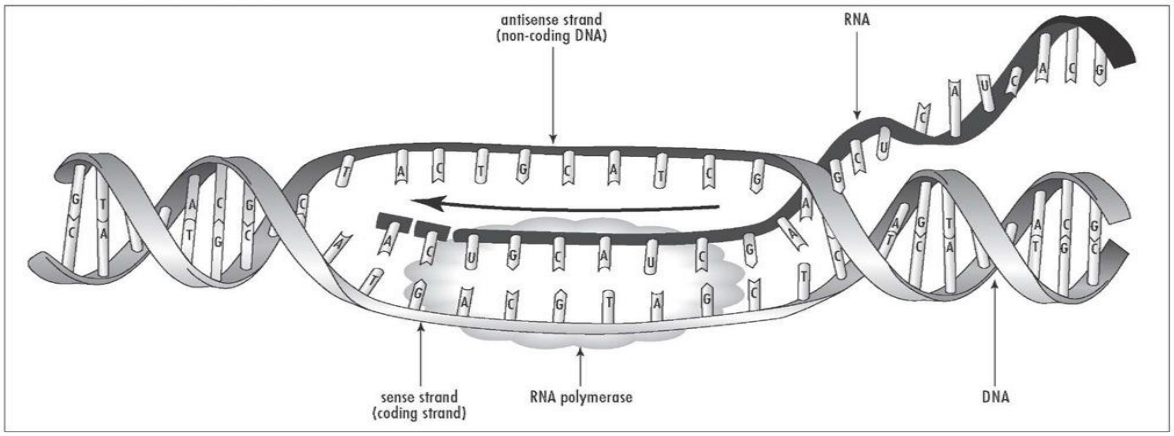
SECTION E

31 (a) Draw a labelled diagram of a sectional view of human seminiferous tubule. (5)
(b) Represent schematically the hormones involved during spermatogenesis in human male.
(c) At which stage of life does gametogenesis gets completed in human male and female respectively.

OR

(a) Draw a diagram of a mature embryo sac of an angiosperm and label all the parts.
(b) What is the fate of seven cells of embryo sac after fertilisation?
(c) Describe the post fertilisation changes that occur after fertilisation.

32 The given diagram depicts the process of transcription. Observe it carefully and answer the following questions: (5)



(a) Identify the cistron in the given transcription unit. Which type of cistron is found in eukaryotes?
(b) Name the enzyme that catalyses transcription of all types of RNA in bacteria? Which substrate it uses to polymerise RNA.
(c) In eukaryotes transcription process has additional two complexities. Explain them.

OR

In 1953 that James Watson and Francis Crick, based on the X-ray diffraction data produced by Maurice Wilkins and Rosalind Franklin, proposed a very simple but famous Double Helix model for the structure of DNA. They had immediately proposed a Semi-conservative model for DNA replication.

(a) Who proved experimentally first that DNA replicates semi conservatively?

(b) Name the organism that was used to prove semi-conservation of DNA replication.

(c) Describe the experiment performed to show DNA replication.

33 (a) Describe the following features that are required to facilitate cloning into a vector. (5)

(i) Selectable marker (ii) Cloning sites

(b) Draw a diagram of E. coli cloning vector pBR322 showing restriction sites, the ori and antibiotic resistance genes.

OR

(a) What are transgenic bacteria? Illustrate it with an example.

(b) What is PCR? Write the principle involved in it.

(c) Enlist the biotechnological applications of PCR in the field of medicine.