

BUDHA DAL PUBLIC SCHOOL, PATIALA

Pre Board Examination (18 December 2025)

Class XII (Science)

Subject - Biology (044) (Set - A)

Time: 3hrs.

M.M. 70

General Instructions:

- (i) All questions are compulsory.
- (ii) The question paper has five sections and 33 questions. All questions are compulsory
- (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

- Q1. Pollen grains are shed at
a) one-celled stage b) 2-3 celled stage c) 3-celled stage d) 4-celled stage
- Q2. Indicate 1, 2 and 3 in the following flow chart
Megaspore mother cell $\xrightarrow{1}$ Megaspores $\xrightarrow{2}$ Embryo sac $\xrightarrow{3}$ egg
a) 1 - Mitosis ; 2 - Mitosis; 3 - Mitosis
b) 1 - Meiosis ; 2 - Amitosis; 3 - Mitosis
c) 1 - Meiosis ; 2 - Mitosis; 3 - Amitosis
d) 1 - Meiosis ; 2 - Mitosis; 3 - Mitosis
- Q3. Human chorionic gonadotrophin (hcg) is secreted by :
a) Chorion b) Amnion c) Corpus luteum d) Placenta
- Q4. E. coli about to replicate was placed in a medium containing radioactive thymidine for five minutes. Then it was made to replicate in a normal medium. Which of the following observation will be correct?
a) Both the strands of DNA will be radioactive
b) One strand radioactive
c) Each strand half radioactive
d) None is radioactive
- Q5. Given below are the steps carried out to construct a recombinant DNA. Which one of the following gives the correct sequence of these steps?
i) Isolation of genetic material
ii) Insertion of recombinant DNA in the host cell/organism
iii) Obtaining the foreign gene product
iv) Amplification of gene of interest
v) Downstream processing
a) (i) , (iii), (iv), (ii), (v) b) (i), (iv); (ii), (iii), (v)
c) (ii), (i), (iii), (iv), (v) d) (ii), (iv), (iv), (iii), (i)
- Q6. In a species the weight of newborn ranges from 2 to 5 kg. 97% of the newborn with an average weight between 3 to 3.3 kg survive whereas 99% of the infants born with weights from 2 to 2.5 kg or 4.5 to 5 kg die. Which type of selection process is taking place?
a) Stabilizing selection b) Disruptive Selection c) Cyclical Selection d) Directional Selection
- Q7. In human beings, where genotype AABBCC represents dark skin colour, aabbcc represents light skin colour and AaBbCc represents intermediate skin colour; the pattern of genetic inheritance can be termed as:
a) Pleiotropy and codominance b) Pleiotropy and incomplete dominance
c) Polygenic and qualitative inheritance d) Polygenic and quantitative inheritance

A - 1



- Q8. The sporozoites that cause 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
- Q9. Disruptive selection favours
 a) only one extreme form a trait b) both the extreme forms of a trait
 c) intermediate form of a trait d) none of these
- Q10. If the sequence of nitrogen bases of the coding strand of DNA in a transcription unit is:
 5' - A T G A A T G - 3', the sequence of bases in its RNA transcript would be
 a) 5 - A U G A A U G - 3' b) 5' - U A C U U A' C - 3'
 c) 5' - C A' U U C A U - 3' d) 5' - G U A A G U A - 3'
- Q11. Locations on sites in the human DNA where single base DNA differences occurs are called
 a) Repetitive DNA b) VNTR c) Snips d) SSBP
- Q12. If BOD of a sample of water is very high, the sample is
 a) highly polluted b) less polluted c) not polluted d) potable
- Two statements are given - one labelled Assertion (A) and the other labeled Reason (R).
 Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:
- a) Both assertion and reason are true, and the reason is correct explanation of the assertion.
 b) Both assertion and reason are true, and the reason is not the correct explanation of the assertion.
 c) Assertion is true but reason is false.
 d) Assertion is false but Reason is true.
- Q13. Assertion : In autogamy, pollination is achieved within the same flower.
 Reason : Autogamy induces cross pollination in flowering plants.
- Q14. Assertion : Natural selection process is a very slow process.
 Reason : Heritable variations gradually added the new characters.
- Q15. Assertion : Dope test is blood test to know whether a person taking part in a competition used drug.
 Reason : A drunken person usually feels tense and less talkative.
- Q16. Assertion : Patents are granted by government to an inventor.
 Reason : Patent prevents other from commercial use of an invention.

Section - B

- Q17. During an excavation assignment, scientists collected pollen grains of a plant preserved in deeper layers of soil. Analyse the properties of pollen grains which help in fossilisation.
- Q18. a) Mention two events in which DNA is unzipped.
 b) Predict the consequences when both the template and coding strands of a DNA segment participate in transcription process.
- Q19. a) Name and state the type of immunity that acts as a 'biological shield' to the developing foetus against many infections in the mother's womb.
 b) A large proportion of infants remain free from potent infections at least three months after birth, or even longer if breast fed. Explain, giving suitable reasons.
- Q20. How is Agrobacterium used to protect tobacco plant from infestation by nematode attack?
- Q21. Biomass of a standing crop of phytoplankton is 4 kg/m² which supports a large standing crop of zooplankton having a biomass 11 kg/m². This is consumed by small fishes having biomass 25 kg/m² which are then consumed by large fishes with the biomass 37 kg/m².
 Draw an ecological pyramid indicating the biomass at each stage and also name the trophic levels. Mention whether it is an upright or inverted pyramid.

A-2

OR

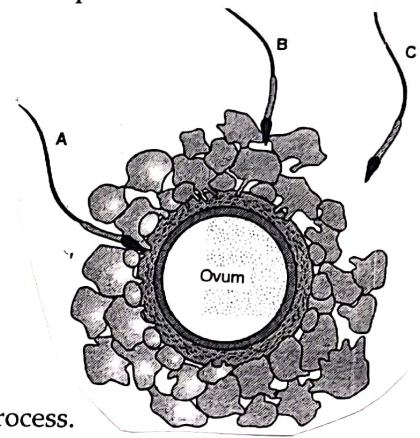
Use the information provided in the table given below to answer the following questions:

Tropic level	Net Production ($\text{KJm}^{-2} \text{y}^{-1}$)	Respiration ($\text{KJm}^{-2} \text{y}^{-1}$)
Top carnivore	50	35
Carnivores	420	378
Herbivores	4490	4041
Producers	45,000	40,367

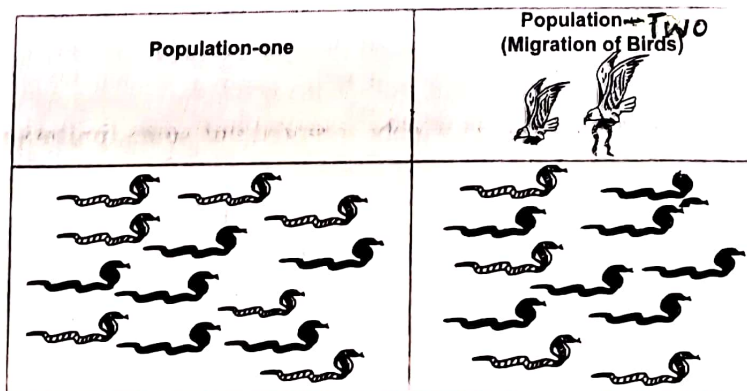
- Calculate the gross primary productivity.
- Analyse the trend in the Net Production from Producers to Top Carnivore. Give a reason for your observation.

Section - C

- Q22. a) A couple where both husband and wife are producing functional gametes, but wife is still unable to conceive, is seeking medical aid. Describe any one method that you can suggest to this couple to become happy parents.
b) Describe the lactational amenorrhea method of birth control.
- Q23. Given below is the diagram of a human ovum surrounded by a few sperms. Observe the diagram and answer the following questions:



- Compare the fate of sperms shown in the diagram.
 - Analyze the changes occurring in the ovum during the process.
 - Mention what helps in the entry of sperm into the ovum.
- Q24. A particular garden pea plant produces only violet flowers.
a) Is it homozygous dominant for the trait or heterozygous?
b) How would you ensure its genotype? Explain with the help of crosses.
- Q25. A population of snakes lived in a desert with dark colour sand. Study the drawings given below showing the changes in the population from 'one' to 'two' over time and answer the question that follows. Dark colour snakes and light colour snakes are represented by alleles A/a (Dominant/ recessive).



- If the frequency of the recessive trait is 9% in population-one, work out the frequency of homozygous dominant and heterozygous dominant snakes.
- Name the mechanism of evolution that must have operated so that population-two evolved from population-one.

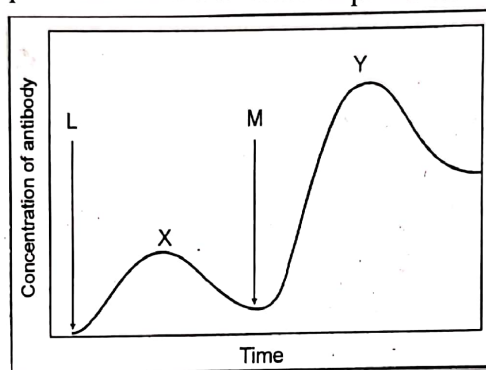
- Q26.
 - What would happen if a large volume of untreated sewage is discharged into a river?
 - In what way anaerobic sludge digestion is important in sewage treatments?

Q27. A person suffering from AIDS dies of opportunistic infections (ARC) i.e. infections that could have been otherwise overcome.

- State one reason as to why an HIV patient dies of 'opportunistic infections'.
- Give the scientific name of one bacterium and one parasite which mainly attack a person suffering from AIDS.
- Write the full form of the name of the widely used diagnostic test for AIDS.

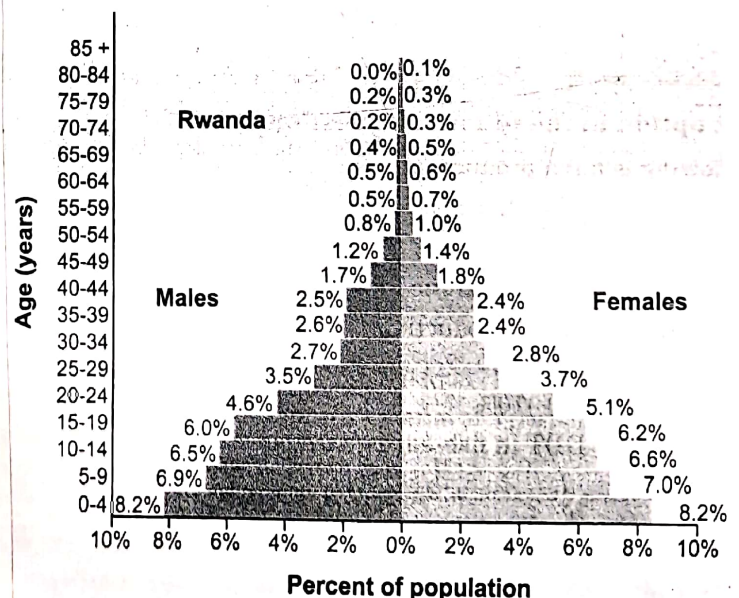
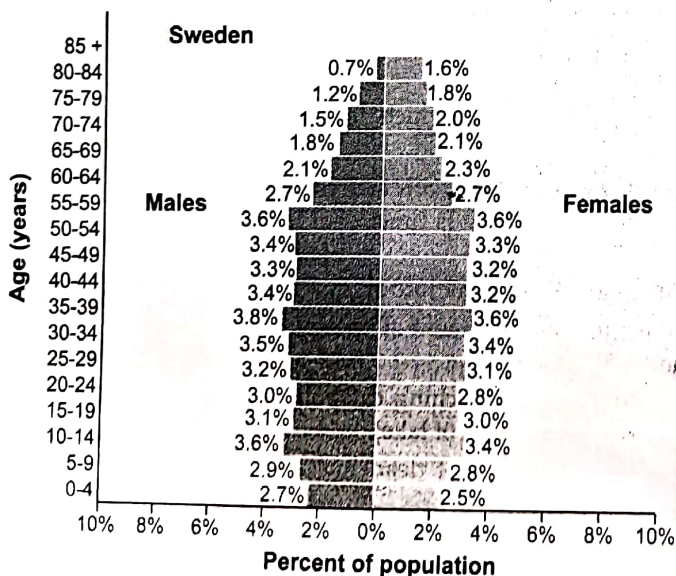
OR

- The graph given below indicates the administration of the first (L) and second doses (M) of a vaccine. The corresponding response of the body is indicated by X and Y. Interpret the graph and explain the reason for such a response shown by the body.



- Why are cannabinoids banned in sports and games?

- Q28.
 - How is rate of decomposition affected by the nature of detritus and temperature?
 - Study the figures given below that depict the comparative age distribution of human populations in Sweden and Rwanda. (International Data Base 2003) and answer the questions that follow:



- What can be inferred from the very broad base of Rwanda's age pyramid? Support your answer with the data provided in the figure.
- Name the type of age pyramid shown above for Sweden.

A-4

Section - D

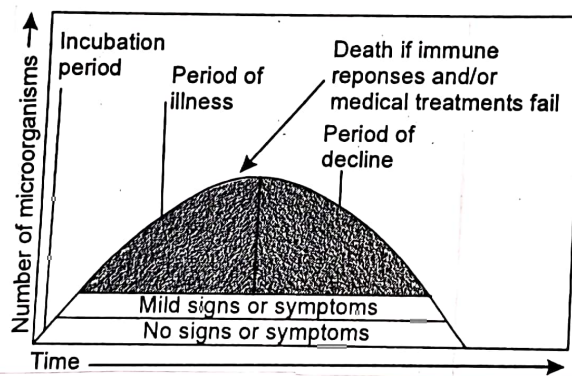
Q29. Read the passage given below and answer the following questions:

The typical ovule is a small structure attached to the parenchymatous cushion placenta by means of a stalk called funicle. The body of the ovule fuses with funicle in the region called hilum. Funicle has vascular strand for the supply of nourishment to the ovule. Thus, hilum represents the junction between ovule and funicle. Each ovule has one or two protective envelopes called integuments. Integuments encircle the ovule except at the tip where a small opening called the micropyle is organized. Opposite the micropylar end, is the chalaza, representing the basal part of the ovule. Enclosed within the integuments is a mass of parenchymatous cells called the nucellus. Cells of the nucellus have abundant reserve food materials. Inside the nucellus is the development of embryo sac or female gametophyte. An ovule generally has a single embryo sac formed from a megaspore.

- Mention the nature of placenta in the ovule?
- Which structure is formed by the megaspore? How many cells are present in that structure?
- Mention the ploidy level of the nucellus?
- Write function of micropyle.

Q30. Read the passage given below and answer the following questions:

When a microorganism invades a host, a definite sequence of events usually occur leading to infection and disease, causing suffering to the host. This process is called pathogenesis. Once a microorganism overcomes the defense system of the host, of the host, development of the disease follows a certain sequence of events as shown in the graph. Study the graph given below for the sequence of events leading to appearances of a disease and answer the questions that follow :



- In which period, according to the graph there are maximum chances of a person transmitting a disease/infection and why?
- Study the graph and write what is an incubation period. Name a sexually transmitted disease that can be easily transmitted during this period. Name the specific type of lymphocytes that are attacked by the pathogen of this disease.

OR

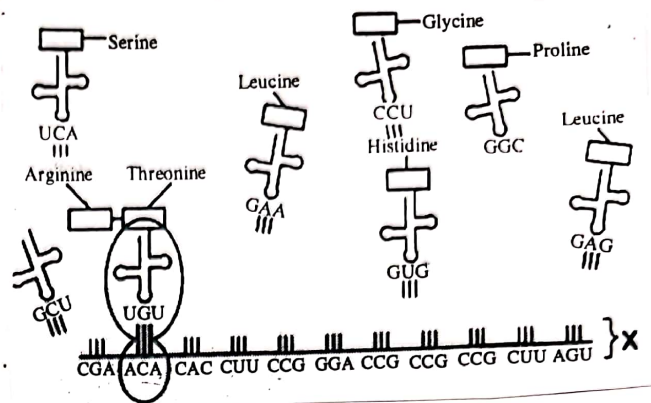
- Draw a schematic labelled diagram of an antibody.
- In which period, the number of immune cells forming antibodies will be the highest in a person suffering from pneumonin? Name the immune cells that produce antibodies.

Section - E

Q31. A scientist isolated mRNA from a eukaryotic cell and compared it to the gene from which it was transcribed. He found that mRNA was shorter. Explain the reason for this observation. Describe the steps leading to the formation of mature mRNA along with diagram.

A-5

- OR
- Explain the process of aminoacylation of tRNA. Mention its role in translation.
 - How do ribosomes in the cells act as factories for protein synthesis?
 - Give below is a strand of mRNA undergoing the process of translation, what will be the sequence of Amino acids that will be translated? Name the triplet codons that should be added to bring to the end of translation at X.

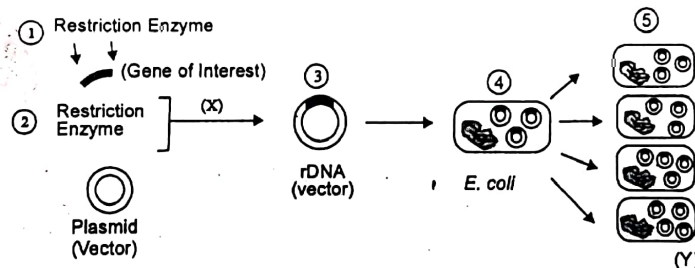


Q32. Answer the following questions based on Bt-crops.

- Why do farmers prefer to grow Bt cotton crop than genetically unmodified cotton crops? Name any two insects that are killed by Bt toxin.
- Explain the mechanism by which Bt toxin kills the insects but not the bacterium which possess the toxin.
- Discuss briefly how a probe is used in molecular diagnostics.

OR

Development of recombinant DNA technology has gates to many breakthroughs in the fields of medicine and agriculture. This has enabled scientists to isolate, sequence and manipulate individual genes obtained from diverse living or dead cells. Given below is a diagram showing the basic steps involved in genetically modifying an organism. Study the given diagram and answer the questions that follow:



- Are two different types of restriction endonucleases used, one to cut the vector DNA and another to cut the desired DNA to be cloned? Support your answer, giving reason.
- Which enzyme is used at step (X) to integrate the foreign DNA with the vector DNA?
- What is the term used for step (Y) showing multiple copies of the foreign DNA being formed in transformed E. coli?
- Draw a diagram of E. coli cloning vector pBR322 to show the following:
 - any one restriction endonuclease site in tetracycline resistance gene.
 - any one restriction endonuclease site in ampicillin resistance gene.
 - 'ori' site

- Q33.
- Explain Brood parasitism and co-evolution of mutualists with the help of one suitable example of each.
 - Explain any two defence mechanisms plants have evolved against their predators. How does predation differ from parasitism?

OR

- According to ecologists, tropical regions in the world account for greater biological diversity. Justify.
- Why are habitat loss and alien species invasion considered as the causes of biodiversity loss? Explain with the help of an example of each.