

BUDHA DAL PUBLIC SCHOOL, PATIALA
Pre Board Examination (18 December 2025)

Class XII (Science)
Subject – Biology (044) (Set - B)

M.M. 70

Time: 3hrs.

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. 8-nucleate embryo sac in flowering plant is
a) Monosporic b) Bisporic c) Tetrasporic d) All the above
- Q2. An angiospermic male plant with 24 chromosomes in its pollen mother cells is crossed with female plant bearing 24 chromosomes in its root cells. What would be the ploidy of embryo and endosperm respectively formed after this cross?
a) 24 and 48 b) 24 and 24 c) 48 and 72 d) 24 and 36
- Q3. The extra-embryonic membranes of mammalian shrinks and becomes filled with cells to form:
a) Follicle cells b) Trophoblast c) Formative cells d) Inner cell mass
- Q4. Read the following statements and choose the correct option:
A) Nitrogenous base is linked to the pentose sugar through a N-glycosidic linkage
B) Phosphate group is linked to 5' - OH of a nucleoside through phosphoester linkage
C) Two nucleosides are linked through 3' - 5' N-glycosidic linkage
D) Negtively charged DNA is wrapped around positively charged histone octamer to form nucleosome
E) The chromatin that is more densely packed and stains dark is called euchromatin
a) A, B and C alone are wrong b) D alone is wrong
c) C and E alone are wrong d) A alone is wrong
- Q5. Which one of the following process results in the production of recombinants in future generations?
i) Mutation
ii) Independent assortment during meiosis I
iii) Independent assortment during meiosis II
iv) Crossing over of bivalents
a) (iv) only b) (ii) and (iv) c) (i), (ii) and (iii) d) (i), (ii), (iii) and (iv)
- Q6. According to Hugo de Vries the mechanism of evolution is
a) Saltation b) Phenotypic variations c) Multiple step mutations d) Minor mutations
- Q7. 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)

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- Q8. The substance produced by a cell in viral infection that can protect other cells from further infection is
a) serotonin b) colostrum c) interferon d) histamine
- Q9. Stabilising 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 in a transcription unit is:
5' - ATGAATG - 3', the sequence of bases in its RNA transcript would be
a) 5' - AUGAAUG - 3' b) 5' - UACUUAC - 3'
c) 5' - CAUUCAU - 3' d) 5' - GUAAGUA - 3'
- Q11. In order to isolate genetic material of a bacterium, the cell must be treated with
a) Lysozyme, ribonuclease, protease, chilled ethanol
b) Cellulase, ribonuclease, protease, chilled ethanol
c) Chitinase, ribonuclease, chilled ethanol, water
d) Ribonuclease, protease, chilled ethanol, water
- Q12. To obtain maximum useful energy which can be efficiently utilized from per kg of cow dung.
a) It must be burnt directly
b) Biogas must be obtained from it
c) It must be converted to manure which may be burnt
d) It must be burnt in semi decayed form

Two statements are given - one labelled Assertion (A) and the other labelled 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 : Pollination by wind is more common amongst abiotic pollination.
Reason : Wind pollination is performed in Vallisneria.
- Q14. Assertion : Gene frequency is never constant in the nature.
Reason : Sudden gain of gene is called genetic drift.
- Q15. Assertion : Morphine is useful for patients under depression.
Reason : Morphine is a very effective sedative painkiller.
- Q16. Assertion : Indian Patents Bill takes cases of biopiracy in consideration.
Reason : Biopiracy is the use of bioresources by multinational companies without proper authorization from concerned persons and countries.

Section - B .

- Q17. Geitonogamous flowering plants are genetically autogamous but functionally cross-pollinated. Justify. Give similarity of geitonogamy with autogamy and xenogamy.
- Q18. a) Name the enzyme that catalyses the transcription of hnRNA.
b) Why does the hnRNA need to undergo changes? List the changes that hnRNA undergoes and where in the cell such changes take place.
- Q19. On a visit to Hill station, one of your friend suddenly become unwell and felt uneasy.
a) List two symptoms you would look for the term it to be due to allergy.
b) Explain the response of the body to an allergen.
c) Name one drug that can be recommended for immediate relief.
- Q20. "RNA interference has been used to produce transgenic tobacco plants to protect them from the infestation by specific nematodes." Explain the novel strategy exploited by the biotechnologists.

Q21. Use the information provided in the table given below to answer the following questions:

Trophic level	Net Production (KJm ⁻² y ⁻¹)	Respiration (KJm ⁻² y ⁻¹)
Top carnivore	50	35
Carnivores	420	378
Herbivores	4490	4041
Producers	45,000	40,367

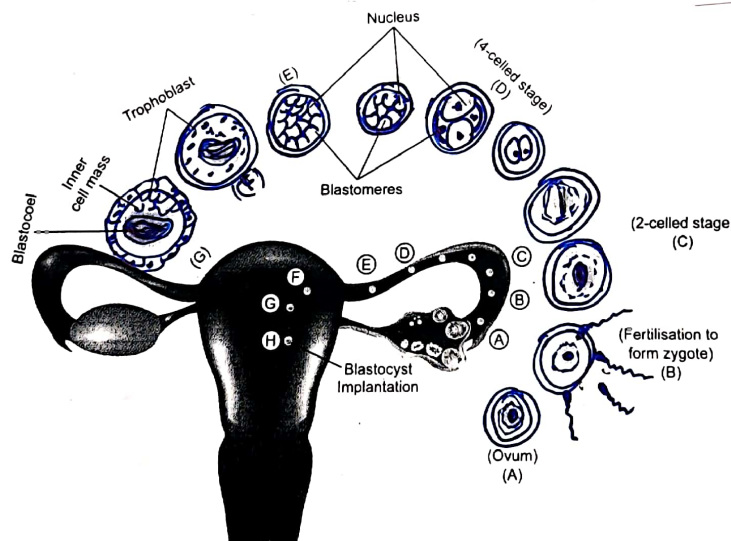
- Calculate the gross primary productivity.
- Analyse the trend in the Net Production from Producers to Top Carnivore. Give a reason for your observation.

OR

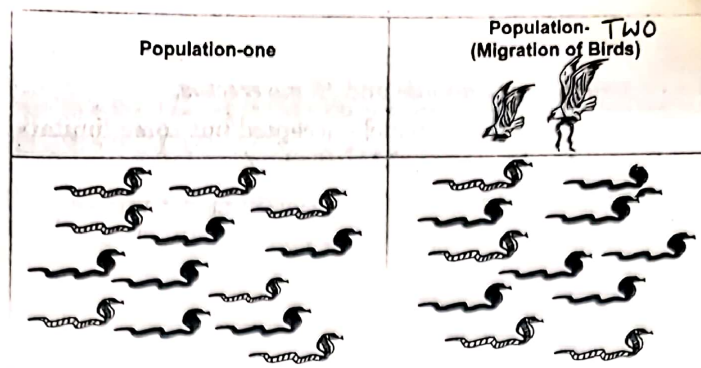
Biomass of a standing crop of phytoplankton is 4 kg/m² which supports a large standing crop of zooplankton having a biomass 11 kg/m². This is consumed by small fishes having biomass 25 kg/m² which are then consumed by large fishes with the biomass 37 kg/m². Draw an ecological pyramid indicating the biomass at each stage and also name the trophic levels. Mention whether it is an upright or inverted pyramid.

Section - C

- An infertile couple is advised to adopt test-tube baby programme. Describe two principle procedures adopted for such technologies.
 - Why is 'Saheli' considered to be an improved form of oral contraceptive for human female?
- Q23. Study the figure given below of a human female reproductive tract showing the transport of ovum, its fertilization and growing embryo moving through the fallopian tube and answer the questions that follow:



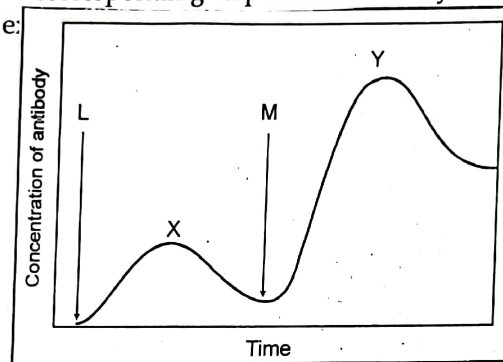
- Identify the embryonic stages 'e' and 'g' and differentiate between them.
 - Describe the process of implantation as shown in figure 'H'.
- Q24. A cross was carried out between a pea plant heterozygous for round and yellow seeds with a pea plant having wrinkled and green seeds.
- Show the cross in a Punnett square.
 - Write the phenotype of the progeny of this cross.
 - What is this cross known as? State the purpose of conducting such a cross.
- Q25. The aeration tank of a sewage treatment plant is not functioning properly. Explain in detail the impact of this on the treatment of sewage and BOD of the effluent.
- Q26. 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.

Q27.

- Why are cannabinoids banned in sports and games?
- 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 e:



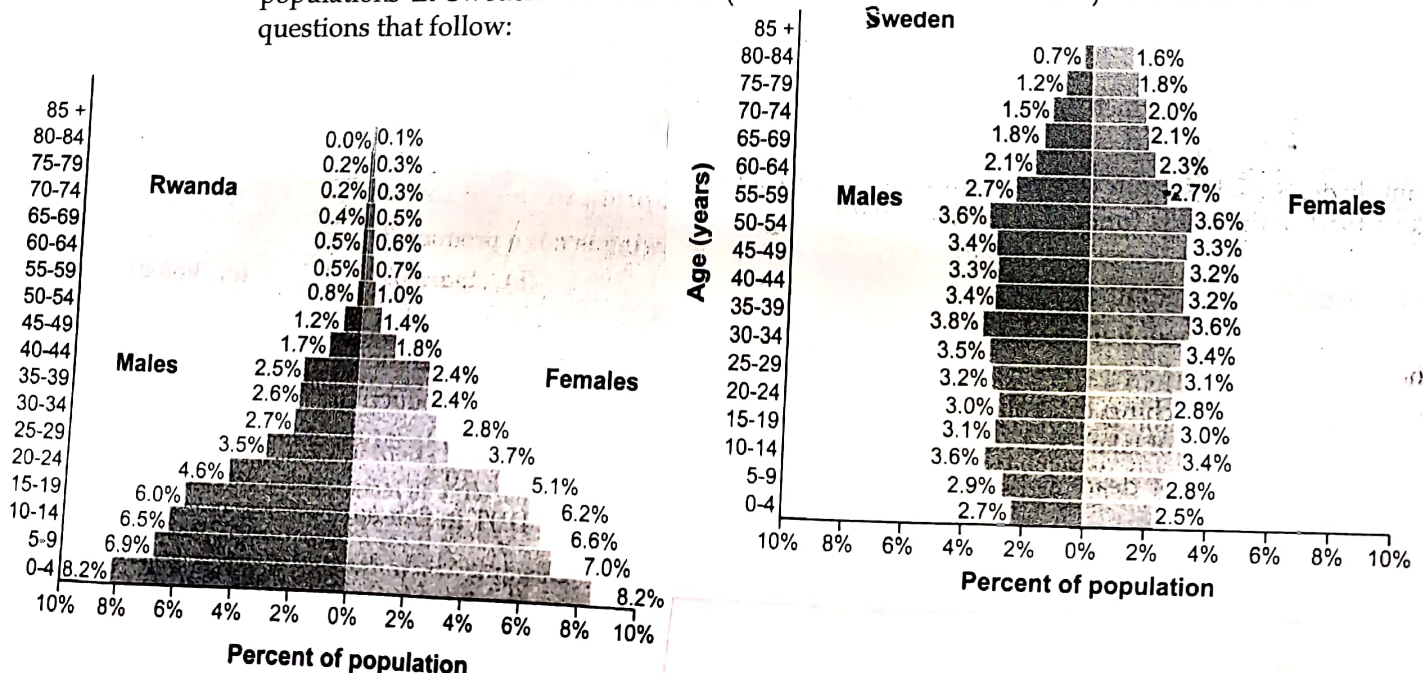
OR

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.

Q28.

- Differentiate between grazing food chain and detritus food chain.
- 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:



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- i) Sweden has an age distribution that is approximately of the same width near its base as at the apex. What does this indicate?
- ii) Name the type of age pyramid shown above for Rwanda.

Section - D

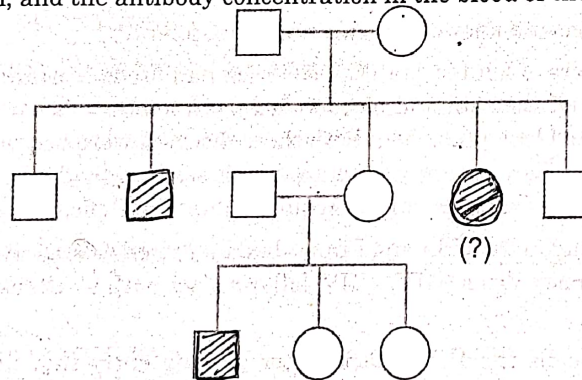
Q29. Read the passage given below and answer the following questions:

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.

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

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

- (a) A time-bound vaccination programme is followed for the children in our country from their birth up to ten years of age. A graph plotted below shows the effect of the vaccination followed by infection by the same pathogen, and the antibody concentration in the blood of the child.



- (i) Explain why the administration of a vaccine causes an increase in the antibody concentration.
- (ii) If the child is infected with the same pathogen almost four months later, the antibody concentration in his/her blood increases very fast. Explain why.
- (iii) A table given below gives information about different types of immunity and how they are attained. Identify 'P', 'Q', 'R', 'S' and 'T' in the table.

[CBSE 2023 (57/1/1)]

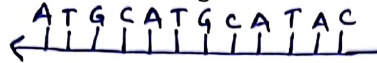
Sl. No.	Types of immunity	Production of antibodies	Presence of memory cells	Mode attained
1.	Natural, active	Yes	'P'	'Q'
2.	Natural, passive	No	'R'	Across the placenta during pregnancy/ breast feeding
3.	Acquired, active	'S'	Yes	Getting a vaccine during breast feeding
4.	Acquired, active	'T'	No	Getting an injection of antibodies

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Section - E

Q31.

- a) Construct a complete transcription unit with promoter and terminator on the basis of the hypothetical template strand given below:



- b) How is transcription a more complex process in eukaryotic cells? Explain the additional processes that a precursor mRNA has to undergo in these organisms.

OR

A researcher introduced a change in the DNA sequence of a gene from AAA to AAG. However, the protein synthesized remained unchanged.

- Explain why there was not change in the protein?
- What does this tell you about the nature of genetic code?
- Explain the process along with its steps by which this protein would normally be synthesized.

Q32.

I) A farmer grew 2 varieties of corn crop in fields A and B. He grew normal corn crops in field A and GM corn crops in field B. He observed corn borers attacked only in field A. To control it, spores of Bt were sprayed in field A.

- Name the gene in the spores responsible for the control of this pest.
- What effect will the spores of Bt have on the insect pest?
- How has field B developed resistance against this pest?

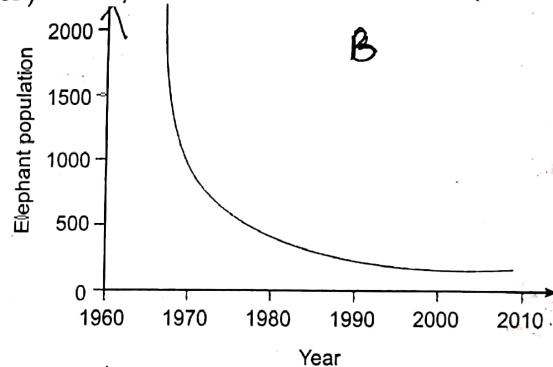
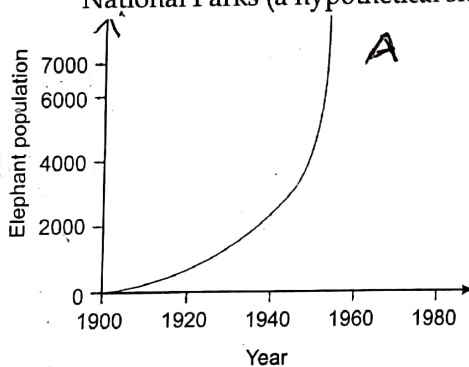
II) Give any two reasons why the patent on Basmati should not have gone to an American Company.

OR

- Draw a schematic diagram of cloning vector and label (i) BamHI site (ii) gene for ampicillin resistance (iii) ori (iv) 'rop' gene
- State the role of 'rop' gene
- Why is insertional inactivation preferred over the use of selectable markers in cloning vectors?

Q33.

- a) The graphs given below, A and B, represent population of elephants in two different National Parks (a hypothetical situation) at different times.



Study the graphs and comment upon the pattern of growth observed. Mention the possible reason for such patterns seen in nature.

- b) Predation is referred to as a detrimental interaction. Explain any three positive roles, supported by an example each, that a predator plays in an ecosystem.

OR

- How does a simple food chain exemplify the First Law of Thermodynamics?
- The table below shows the number of species in different parts of the world.

Name of Place	Number of Bird species
Columbia	1400
India	1200
Northern South America	1300
New York	105
Denmark	504

Identify the common factor in regions with a higher number of bird species and suggest at least two reasons for this greater diversity.