KENDRIYA VIDYALAYA SANGATHAN TINSUKIA REGION
PRE-BOARD EXAMINATION 2025-26
Subject: - BIOLOGY Subject Code (CBSE): -044
Class: --XII

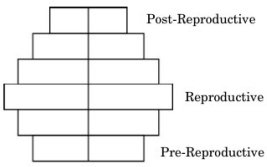
Q.P. Code: -QP12BIO02PB25 Maximum Marks: -70
Time Allowed: - 3 hours

GENERAL INSTRUCTIONS:
Read the following instructions carefully and follow them:

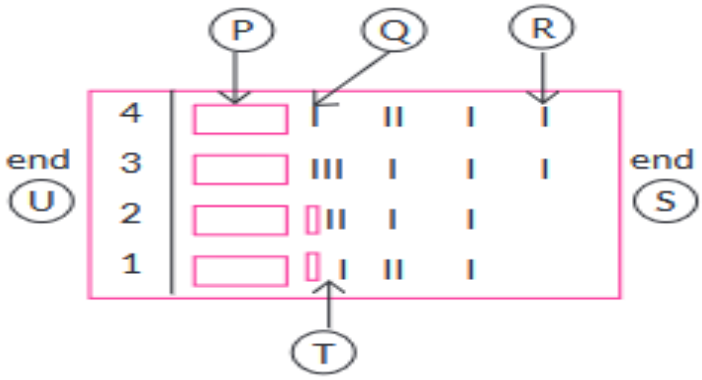
(i) All questions are compulsory.
(ii) The question paper has five sections and 33 questions.
(iii) Section–A has 16 questions of 1 mark each; Section–B has 5 questions of 2 marks each; Section– C has 7 questions of 3 marks each; Section– D has 2 case-based questions of 4 marks each; and Section–E has 3 questions of 5 marks each.
(iv) There is no overall choice. Answer all 33 questions. 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 labeled diagrams should be drawn.

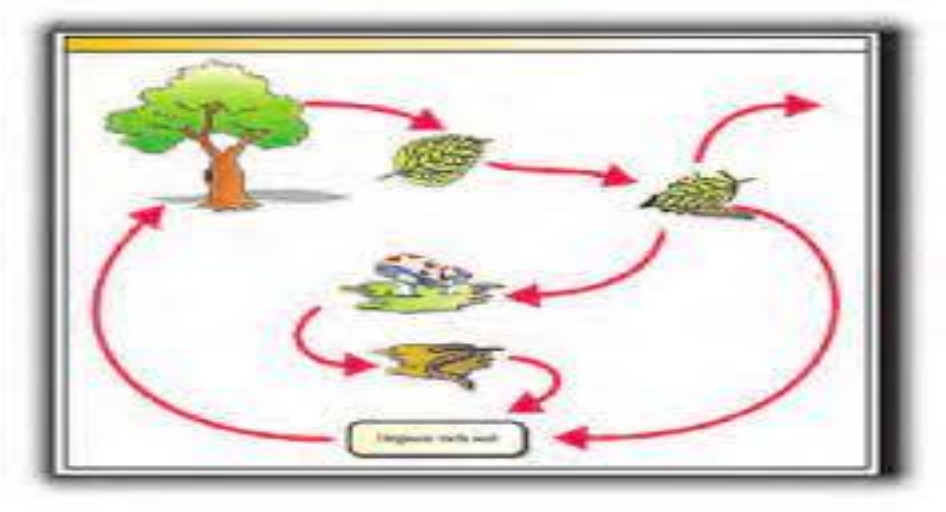
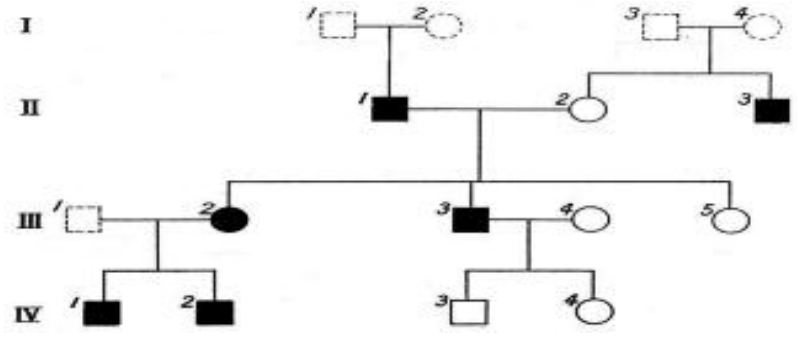
Q. NO.	**Section – A** Q. No. 1 to 12 are multiple choice questions. Only one of the choices is correct. Select and write the correct choice as well as the answer to these questions.	**MARKS**
1	If a natural population with 200 individuals is in Hardy-Weinberg equilibrium for a gene with two alleles A and a, with the gene frequency of allele A of 0·8, the genotype frequency of Aa will be: (A) 0·8 (B) 0·16 (C) 0·32 (D) 0·64	1
2	Select the incorrect match from the following: Human Karyotype Characters (A) 45 + XX Broad palm with characteristic palm crease (B) 44 + XXY Overall feminine development (C) 44 + XO Sterile females as ovaries are rudimentary (D) 44 + XY Normal male	1
3	In humans, the secondary oocyte completes meiotic division when: (A) it gets implanted in the uterine endometrium. (B) it is released from the matured Graafian follicle. (C) it is penetrated by the sperm cell. (D) acrosomal enzymes break down the zona pellucida.	1
4	Which one of the following options is **not** a characteristic of acquired immunity? (A) It is pathogen specific. (B) It is not characterised by memory.	1

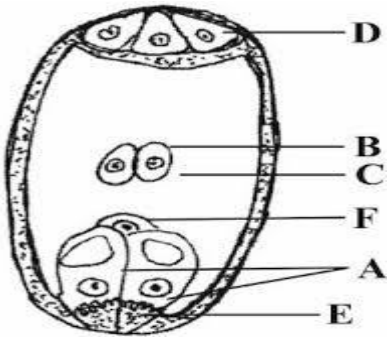
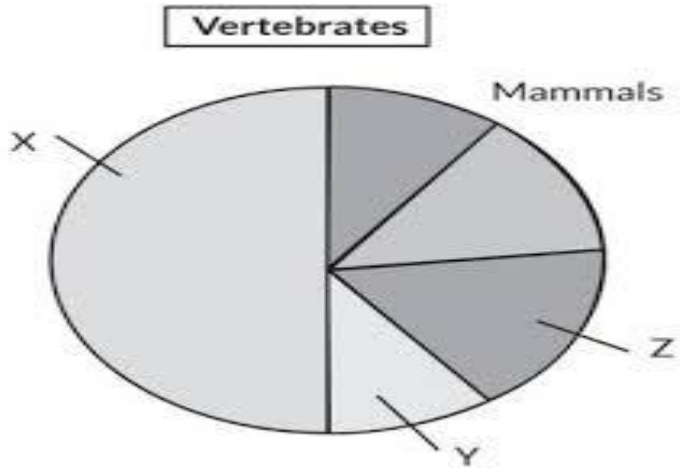
	(C) On first contact it produces a primary response. (D) Subsequent encounter elicits a secondary response.	
5	A DNA fragment has 2500 nucleotides, out of which 240 are Guanine. How many bases having double hydrogen bonds between them does this DNA fragment possess? (A) 480 (B) 720 (C) 1010 (D) 2020	1
6	In a fertilized ovule of an angiosperm, the cells in which n, 2n and 3n conditions respectively occur are: (A) antipodal, zygote and endosperm (B) zygote, nucellus and endosperm (C) endosperm, nucellus and zygote (D) antipodals, synergids and integuments	1
7	Bottled fruit juices are clearer as compared to those made at home, as they are clarified by the use of: (A) Lipases and pectinases (B) Pectinases and proteases (C) Proteases and cellulases (D) Nucleases and lipases	1
8	The periodic abstinence by a couple for family planning should be from: (A) Day 5 to 10 of menstrual cycle (B) Day 13 to 15 of menstrual cycle (C) Day 10 to 17 of menstrual cycle (D) Day 16 to 20 of menstrual cycle	1
9	Human settlement often leads to habitat loss which leads to fragmentation, forming smaller patches of habitats. Select the statements that describe how a small patch differs from a large patch of the same habitat. (i) Invasive species will never be seen here. (ii) Population of large animals decreases. (iii) Biodiversity decreases. (iv) Competition from surrounding habitats increases. (A) (ii), (iii) and (iv) only (B) (ii) and (iv) only (C) (i) and (iii) only (D) (i), (ii) and (iii) only	1
10	The status of the human population reflected in the human age pyramid given below is:	1

<table>
<tr><td></td><td> 

(A) Declining population
(B) Stable population
(C) Expanding population
(D) Extinct population</td><td></td></tr>
<tr><td>11</td><td>Eco R1 cuts the DNA between bases G and A only when the sequence of GAATTC is present. The number of nucleotides present in the resultant sticky ends that will be formed in each of the two strands of DNA after this enzyme cuts the DNA will be:
<table>
<tr><td></td><td>Vector DNA</td><td>Foreign DNA</td></tr>
<tr><td>A,</td><td>1 & 5</td><td>5 & 1</td></tr>
<tr><td>B.</td><td>2 & 4</td><td>4 & 2</td></tr>
<tr><td>C.</td><td>2 & 5</td><td>5 & 2</td></tr>
<tr><td>D.</td><td>3 & 4</td><td>4 & 3</td></tr>
</table></td><td>1</td></tr>
<tr><td>12</td><td>Interaction between clown fish living among the stinging tentacles of sea anemone is an example of:
(A) Amensalism
(B) Parasitism
(C) Mutualism
(D) Commensalism</td><td>1</td></tr>
<tr><td colspan="3">Question Nos. 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.</td></tr>
<tr><td>13</td><td>Assertion: A person infected with malaria suffers from chill and high fever, recurring every three or four days.
Reason: The parasite attacks the RBC resulting in their rupture and release of haemozoin.</td><td>1</td></tr>
<tr><td>14</td><td>Assertion: A given fig species can be pollinated only by its partner’ wasp.
Reason: The wasp pollinates the fig inflorescence while searching for suitable egg laying sites.</td><td>1</td></tr>
<tr><td>15</td><td>Assertion: DNA fragments can be isolated by Gel electrophoresis on the basis of their size.
Reason: The larger the fragment size, the faster it moves.</td><td>1</td></tr>
</table>

16	**Assertion:** In a field experiment, when all the starfish were removed from an enclosed intertidal area, more than 10 species of invertebrates became extinct within a year. **Reason:** This happened due to intraspecific competition.	1
	SECTION-B	
17	***Attempt either option A or B.*** A) a) Given below is the stepwise schematic representation of the process of electrophoresis. Identify the 'alphabets' representing (i) Anode end (ii) smallest/lightest DNA strand in the matrix (iii) Agarose gel (iv) Wells  OR B) Write the role of ori and 'restriction' site in a cloning vector pBR322.	2
18	Give reasons for the following: (i) Why can a woman generally not conceive a child after 50 years of age? (ii) Polar bodies are formed during oogenesis and not during spermatogenesis.	2
19	Consider the given data of a hypothetical small portion of mRNA that codes for a functional polypeptide chain and answer the questions that follow: **mRNA 5'- UCAUUACCACGAUUCUUUAAAAGA- 3'** (a) How many amino acids will be formed from the given codons, if substitution of U by C takes place at the 5th codon? Explain your answer. (b) Write the number of amino acids that would be in the polypeptide synthesised by a similar mRNA as above, where in the fourth where in the fourth codon a mutation changes it into a stop codon.	2
20	***Attempt either option A or B.*** A) Different varieties of cheese are known by their characteristic texture, flavour and taste, the specificity coming from the microbes used. Support this statement with the help of two suitable examples. OR B) Mention the chemical nature of an antibody and name the type of cells they are produced by. Write the differences between active and passive immune responses on the basis of antibodies.	2

21	***Attempt either option A or B.*** A. Correctly depict (also indicate the trophic level) and describe the ecological pyramid of biomass in sea with 40 standing crops of phytoplankton supporting 90 standing crops of zooplankton which further supports 120 small fishes. OR B.  . I. How are nutrients recycled back into the ecosystem as shown in the figure? II. The figure shows that some nutrients are lost by leaching. Why is this process ecologically significant?	2
	SECTION-C	
22	The first clinical gene therapy was given in 1990 to a 4-year-old girl with ADA deficiency. (a) Mention the cause of this disorder. (b) List the possible treatments available for this disorder. (c) How can this disorder be cured permanently?	3
23	Study the pedigree chart given below and answer the questions that follow: Symbols used in the given pedigree chart are as follows:  	3

	(a) On the basis of the inheritance pattern exhibited in this pedigree chart, What conclusion can you draw about the pattern of inheritance? (b) If the female is homozygous for the affected trait in this pedigree chart, ther what percentage of her sons will be affected? (c) Give the genotype of offspring 2 and 3 in III generation.	
24	Identify the following part mentioned below and write their function.  (i)Filiform apparatus (ii)Synergids (iii) Central cell	3
25	Enumerate the events in the ovary of a human female during: (i) Follicular phase (ii) Luteal phase of menstrual cycle.	3
26	(i) Name the group of cells the HIV enters after getting into the human body. (ii) What happens in these cells and what are these cells subsequently referred to as? (iii) Name the next group of cells the HIV attacks from here.	3
27	(a) Write the difference between proinsulin and mature insulin. (b) How did American company Eli Lilly produce human insulin using rDNA technique?	3
28	Given below is a 'pie chart' representing the global biodiversity: proportionate number of species of major taxa.  (i) Identify (X) and (Y) in the given 'pie chart'. (ii) "Extinction of species across taxa are not random." Which group amongst the vertebrates is more vulnerable to extinction?	3

	(iii) Give one example each of recent extinctions of species in Russia, Mauritius and Australia.	
	SECTION-D (CASE BASED QUESTIONS)	
29	In England, the dark form of peppered moth (Biston betularia) increased during the Industrial Revolution due to soot-covered trees. With air pollution control measures, light-colored moths have again become more common. Answer the following: (a) Which evolutionary mechanism is illustrated here? ***Attempt either subpart (b) or (c).*** (b) Why did the dark form have a selective advantage earlier, and why did the light form regain it later? **OR** (c) What does this example prove about natural selection — is it directional, stabilizing or disruptive? (d) Name another environmental factor in present times that can similarly alter gene frequencies.	4
30	Wastewater from homes and industries is treated in sewage treatment plants (STPs). It involves primary treatment, followed by secondary treatment with microbial action, and finally disinfection. Answer the following: (a) What is the role of microbes in secondary treatment? ***Attempt either subpart (b) or (c).*** (b) Explain the significance of activated sludge. **OR** (c) Name two groups of organisms which constitute 'flocs'. Write their influence on the level on BOD during biological treatment of sewage. (d) Why is this treatment essential?	4
	SECTION-E	
31	a) Define double fertilization. (1 mark) b) What is the product of triple fusion? (1 mark) c) Which part of the ovule develops into the seed coat? (1 mark) d)How does double fertilization ensure proper nourishment of the developing embryo? (2 marks) **OR** a) Distinguish between spermatogonia and spermatids based on ploidy and function. (1.5 marks) b) Differentiate spermatogenesis from spermiogenesis. (1.5 marks)	5

	c) At what stage of the menstrual cycle does implantation occur? (1 mark) d) What is the ploidy of spermatids? (1 mark)	
32	(i) Describe the structure and function of a t-RNA molecule. Why is it referred to as an adapter molecule? (ii)Explain the process of splicing of hn-RNA in a eukaryotic cell with suitable diagram **OR** The lac operon in E. coli is a classic example of gene regulation. a) What will happen to the expression of lac operon if lactose is absent but glucose is present? (1.5 marks) b) Why is lac operon called an inducible operon? (1.5 marks) c) A scientist wants to design bacteria that can digest a new sugar other than lactose. Which component of the operon mechanism (structural genes, promoter, operator, or repressor) would need modification? Justify. (2 marks)	5
33	(i)How has biotechnology helped in producing the Meloidogyne incognita resistant tobacco plant? (ii)Why does this nematode die on eating such a GM plant? **OR** Biotechnology uses advanced techniques like PCR and bioreactors for large-scale production. Answer the following: a) PCR can make billions of copies of a gene in a short time. If a scientist accidentally omits the DNA polymerase enzyme in the reaction, what would happen? Explain. (1 mark) b) In a bioreactor, why is the supply of sterile air and constant agitation necessary? Relate it to cell growth. (1 mark) c) Out of the steps of biotechnology (gene identification, insertion into vector, maintenance in host, downstream processing), which step would be most affected if the host organism loses its plasmid? Why? (1 marks) d) If PCR gives you millions of copies of a gene, why can't we directly use them for producing insulin in patients? What extra step is required? (2marks)	5