



COMMON PRE-BOARD EXAMINATION BIOLOGY–Code No. 044




CLASS-XII-(2025-26)

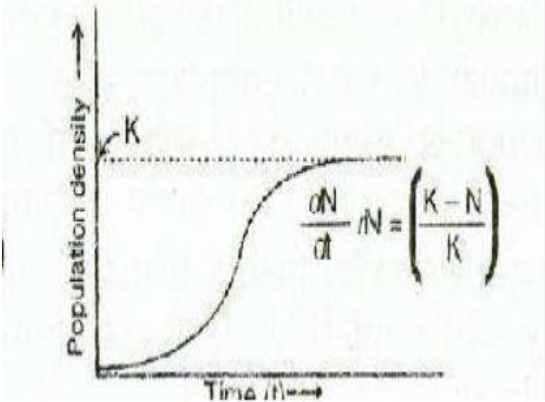
SET: 1

Marking Scheme

1.	C. lysozyme	1
2.	D. Type 3 pollination brings genetically different pollen grains to the stigma.	1
3.	C 0.48	1
4.	C. i-r, ii-s, iii-p, iv-q	1
5.	D. cryIAb	1
6.	C it is penetrated by the sperm cell	1
7.	B. 5' (upstream) end and 3' (downstream) end, respectively of the transcription unit	1
8.	C. iii, iv, i, ii, v	1
9.	C. Embryo sac	1
10.	D. B,A,C	1
11.	A. convergent evolution.	1
12.	C- GEAC is Genetic Engineering Approval Company	1
13.	Option D	1
14.	Option C	1
15.	Option C	1
16.	Option A	1
Section – B		
17.	<p>A. In some species, pollen release and stigma receptivity are not synchronized. In some other species, the anther and stigma are placed at different positions so that the pollen cannot come in contact with the stigma of the same flower. Self-incompatibility. Production of unisexual flowers. $\frac{1}{2} \times 4=2$marks 2 marks</p> <p>B.(i)Diagram $\frac{1}{2}$ mark, any two outer layers $\frac{1}{2}$ mark each, (epidermis, endothecium, middle layer) (ii)Tapetum- $\frac{1}{2}$ mark</p>	2
18.	<p>A.(i) AUG. UAC-anticodon Methionine-Amino acid (ii) If two charged tRNAs are brought close enough, the formation of a peptide bond between the amino acids would be energetically favoured. $\frac{1}{2} \times 4=2$marks</p>	2
19.	<p>Diagram -Sea (inverted) $\frac{1}{2}$ mark Biomass of fish far exceeds that of phytoplankton $\frac{1}{2}$ mark Diagram-Forest(upright) $\frac{1}{2}$ mark . Biomass of producer exceeds other trophic levels. $\frac{1}{2}$ mark</p>	2

		
20	<p><u>Attempt either option A or B.</u> A.A. Opioid B. <i>Cannabis sativa</i> C. <i>Erythroxylum coca</i> D. Euphoria/Hallucinations $\frac{1}{2}$ mark x 4 = 2marks B. Reverse transcription, attack macrophages (1+1=2)</p>	2
21	<p><u>Attempt either option A or B.</u> A.(i) A Vector B Foreign DNA $\frac{1}{2} + \frac{1}{2} = 1$ mark (ii) GAATTC CTTAAG $\frac{1}{2}$ mark (iii) DNA Ligase $\frac{1}{2}$ mark</p> <p style="text-align: center;">OR</p> <p>B.(i) E.coli or other suitable host $\frac{1}{2}$ mark (ii) Ampicillin, Tetracyclin, to identify the transformed cells from non transformed cells $\frac{1}{2} \times 3 = 1 \frac{1}{2}$ marks</p>	2
Section – C		
22	<p>LH and FSH $\frac{1}{2} + \frac{1}{2} = 1$ mark</p> <p>LH acts at the Leydig cells and stimulates synthesis and secretion of androgens. FSH acts on the Sertoli cells and stimulates secretion of some factors which help in the process of spermiogenesis. 1 mark (ii) After spermiogenesis, sperm heads become embedded in the Sertoli cells, and are finally released from the seminiferous tubules by the process called spermiation. 1 mark</p>	3
23	<p>Fauna: The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of cichlid fish in the lake. The recent illegal introduction of the African catfish <i>Clarias gariepinus</i> for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers. Any one example-1 mark Flora: Invasive weed species like carrot grass (Parthenium), Lantana and water hyacinth (Eicchornia) any one example- $\frac{1}{2}$ mark Other causes: Habitat loss and fragmentation, over exploitation, co-extinctions (1 $\frac{1}{2}$ marks)</p>	3
24	<p>Oswald Avery, Colin MacLeod and Maclyn McCarty purified biochemicals (proteins, DNA, RNA, etc.) from the heat-killed S cells to see which ones could transform live R cells into S cells. protein-digesting enzymes (proteases) and RNA-digesting enzymes (RNases) did not affect transformation, so the transforming substance was not a protein or RNA. Digestion with DNase did inhibit transformation, suggesting that the DNA caused the transformation.</p>	3
25	<p>Cyclosporin A, that is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus <i>Trichoderma polysporum</i>. Statins produced by the yeast <i>Monascus purpureus</i> -blood-cholesterol lowering agents. Or any other suitable example $\frac{1}{2} \times 6 = 3$marks</p>	3

26	Copper releasing IUDs (CuT, Cu7, Multiload 375) any two = $\frac{1}{2} + \frac{1}{2} = 1$ mark. The Cu ions released suppress sperm motility and the fertilising capacity of sperms- $\frac{1}{2} + \frac{1}{2} = 1$ mark (iii) Intra uterine insemination. 1 mark	3
27	Natural selection can lead to stabilisation (in which more individuals acquire mean character value), directional change (more individuals acquire value other than the mean character value) or disruption (more individuals acquire peripheral character value at both ends of the distribution curve) (1 ½ marks) Representation: 1½ marks	3
28	A. (i) B- GTG Y- GUG (1 mark) (ii) Mendelian disorders are mainly determined by alteration or mutation in the single gene. Sickle cell anaemia single gene mutation or point mutation. Glutamic acid in 6th position replaced by valine (β chain). 2 marks	3
Section – D		
29	A. Asteraceae and grasses 1 mark B. some of the nucellar cells surrounding the embryo sac start dividing, protrude into the embryo sac and develop into the embryos. 2marks Attempt either subpart C or D C. Desirable hybrid characteristics can be maintained over generations without segregation. Farmers do not need to buy hybrid seeds every season, as apomictic plants can produce identical seeds year after year. Apomictic seeds produce offspring that are genetically identical to the parent plant, preserving desirable traits. Any 2 points =1mark D. Parthenocarpy 1mark	4
30	A. When ready-made antibodies are directly given to protect the body against foreign agents, it is called passive immunity eg- colostrum secreted by mother or other antibodies received from mother through placenta $\frac{1}{2} + \frac{1}{2} = 1$ mark (or any other suitable example) B. The immune system produces antibodies and memory cells specific to that virus. During anamnestic response/secondary response due to this memory cells, body recognises the pathogen fast. 2 marks Attempt either subpart C or D C. IgE 1mark D. Due to genetic and other unknown reasons, the body attacks self-cells. This results in damage to the body and is called auto-immune disease eg-Rheumatoid arthritis. $\frac{1}{2}$ mark+ $\frac{1}{2}$ mark=1mark (or any other suitable example)	4
Section – E		
31	A.(i) a. Mutualism b. Commensalism	5

	<p>c. Competition 1 ½ marks (ii) declining. ½ mark (iii) A population growing in a habitat with limited resources show initially a lag phase, followed by phases of acceleration and deceleration and finally an asymptote, when the population density reaches the carrying capacity. A plot of N in relation to time (t) results in a sigmoid curve. This type of population growth is called Verhulst-Pearl Logistic Growth and is described by</p> $\frac{dN}{dt} = rN \left(\frac{K - N}{K} \right)$ <p>Where N = Population density at time t r = Intrinsic rate of natural increase K = Carrying capacity. Explanation 1 mark+ Diagram 1 mark + Equation 1 mark.= 3marks</p> <p style="text-align: center;">OR</p> <p>B. Type of food chains:</p> <ul style="list-style-type: none"> • Aquatic ecosystem: <i>Grazing food chain</i> • Terrestrial ecosystem: <i>Detritus food chain</i> 1 mark 			
	<p>Differences between Grazing and Detritus Food Chains:</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <p>Grazing Food Chain</p> <ol style="list-style-type: none"> 1. Begins with living green plants (producers). 2. Major energy flow occurs through herbivores feeding on producers. 3. Common in aquatic ecosystems. </td> <td style="width: 50%; vertical-align: top;"> <p>Detritus Food Chain</p> <ol style="list-style-type: none"> 1. Begins with dead organic matter (detritus). 2. Major energy flow occurs through decomposers feeding on detritus. 3. Common in terrestrial ecosystems. </td> </tr> </table> <p>Any 2 points-2marks. (ii) Chemical nature of detritus - Substances like cellulose and lignin decompose slowly, while sugars and proteins decompose faster. Temperature - Warm and moist conditions favour rapid decomposition, while low temperatures slow it down. 1+1 2marks</p>	<p>Grazing Food Chain</p> <ol style="list-style-type: none"> 1. Begins with living green plants (producers). 2. Major energy flow occurs through herbivores feeding on producers. 3. Common in aquatic ecosystems. 	<p>Detritus Food Chain</p> <ol style="list-style-type: none"> 1. Begins with dead organic matter (detritus). 2. Major energy flow occurs through decomposers feeding on detritus. 3. Common in terrestrial ecosystems. 	
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<p>32</p>	<p>(i) Gel electrophoresis- 1 mark DNA fragments are negatively charged molecules, and when an electric field is applied, they move towards the positive electrode (anode). The smaller fragments move faster through the gel matrix than the larger ones, thus separating according to size.-1mark (ii) Agarose gel. -1 mark (iii) The separated DNA fragments are visualised under UV light after staining with a dye such as ethidium bromide -1mark The desired DNA band is then cut out from the gel and purified using elution. 1 mark</p> <p style="text-align: center;">OR</p> <p>B. (i) PCR-Polymerase chain reaction. 1 mark (ii) Taq polymerase. <i>Thermus aquaticus</i> 1mark</p>	<p>5</p>		

(iii) Multiple copies of the gene (or DNA) of interest is synthesised in vitro using two sets of primers (small chemically synthesised oligonucleotides that are complementary to the regions of DNA) and the enzyme DNA polymerase. Polymerase chain reaction (PCR): Each cycle has three steps: (i) Denaturation; (ii) Primer annealing; and (iii) Extension of primers. The enzyme extends the primers using the nucleotides provided in the reaction and the genomic DNA as template. **3 mark**

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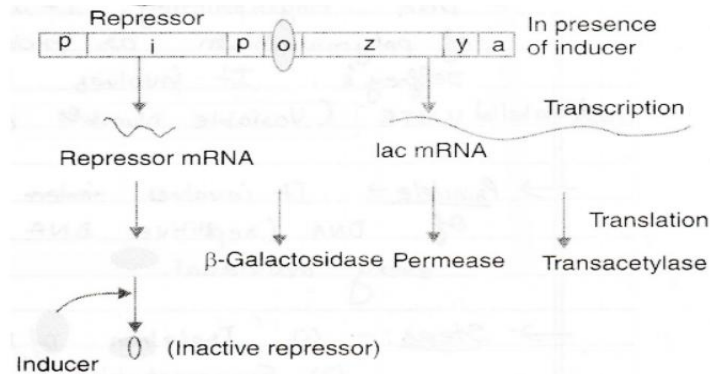


Diagram with labelling 2 marks

Lactose(inducer) $\frac{1}{2}$ **mark** binds itself to active repressor and changes its structure. The repressor now fails to bind to the operator. $\frac{1}{2}$ **mark** Then RNA polymerase starts transcription of operon by binding to the promoter site P. **1 mark** the three enzymes for lactose metabolism are synthesized. **1mark**

OR

B.

(i)DNA finger printing/Forensic science-**1 mark. Significance-** -criminal investigations, paternity testing, and identifying genetic relationships **any 2 points ($\frac{1}{2} + \frac{1}{2} = 1$ mark)**

- (i) **The RNA polymerase I** transcribes rRNAs (28S, 18S, and 5.8S) $\frac{1}{2}$ **mark**
- (ii) **The RNA polymerase III** is responsible for transcription of tRNA, 5srRNA, and snRNAs (small nuclear RNAs). $\frac{1}{2}$ **mark**
- (iii) **The RNA polymerase II** transcribes precursor of mRNA, the heterogeneous nuclear RNA (hnRNA). $\frac{1}{2}$ **mark**
- (iv) The second complexity is that the primary transcripts contain both the exons and the introns and are non-functional. Hence, it is subjected to a process called **splicing** where the introns are removed and exons are joined in a defined order. hnRNA undergoes additional processing called as **capping** and **tailing**. In capping an unusual nucleotide (methyl guanosine triphosphate) is added to the 5'-end of hnRNA. **In tailing**, adenylate residues (200-300) are added at 3'-end in a template independent manner. It is the fully processed hnRNA, **(1 $\frac{1}{2}$ marks)**

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