

PRE-BOARD EXAMINATION 2025-26
MARKING SCHEME
SET 2

CLASS : XII

Subject : Biology (044)

Section – A		
Q. No.	Questions	Marks
1	C.X is cotyledon, Y is suspensor and Z is radicle.	1
2	C. 2 polar nuclei + 1 male gamete nucleus	1
3	B.Dioecious plant bearing only male or female flowers	1
4	C.Secondary spermatocytes have 23 chromosomes and undergo second meiotic division.	1
5	B.G 17%, A 33%, T 33%	1
6	D.Autosomal dominant, Myotonic dystrophy	1
7	B.A- (ii), B- (iii), C- (iv), D- (i)	1
8	A. Morphine	1
9	C.passive immunity	1
10	B. Genetic drift is absent.	1
11	C.analogous organs that have evolved due to convergent evolution	1
12	B.5' (upstream) end and 3' (downstream) end, respectively of the transcription unit	1
13	A. Both A and R are true and R is the correct explanation of A	1
14	C. A is true but R is false	1
15	C. A is true but R is false	1
16	C. A is true but R is false	1
Section – B		
17	<p>Attempt either option A or B.</p> <p>A. (i) Sea, phytoplanktons less- 1</p> <p>(ii) No- ½ , loss of energy at every step means that the bottom of the pyramid (producers) will always have the most energy - ½</p> <p style="text-align: center;">OR</p> <p>B. (i) EX- SITU- ½</p> <p>(ii) it is primarily driven by human activities like habitat destruction, climate change, pollution, and overexploitation, whereas past extinctions were caused by natural events like asteroid impacts or volcanic eruptions.- 1 ½</p>	<p>2</p> <p>1+1</p>
18	<p>(i) Lactose/allolactose- ½</p> <p>(ii) binding of the inducer results in the "switching on" of the operon. -1</p> <p>(iii) Trans acetylase – ½</p>	1+1

19	<p>A.</p> <p>(i) Passive immunization.- antivenom injection or maternal antibodies passed to a newborn- ½</p> <p>(ii) Anti- histamine- allergic reactions, such as hay fever, by blocking the action of histamine.- ½</p> <p>(iii) Colostrum- first milk produced by mammals and is rich in maternal antibodies that provide passive immunity to newborns.- ½</p> <p>(iv) Cytokine- barrier- infected cells release interferons to prevent viruses from spreading to neighboring cells. – ½</p> <p style="text-align: center;">OR</p> <p>B.</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 30%;">Immunity Type</td> <td style="width: 35%;">Provides active immunity- ½</td> <td style="width: 35%;">Provides passive immunity, - ½</td> </tr> <tr> <td>Immune Response</td> <td>Stimulates the body to create its own antibodies and memory cells against a pathogen.- ½</td> <td>The body does not produce its own antibodies; it is simply given antibodies from an external source. – ½</td> </tr> </table>	Immunity Type	Provides active immunity - ½	Provides passive immunity , - ½	Immune Response	Stimulates the body to create its own antibodies and memory cells against a pathogen.- ½	The body does not produce its own antibodies; it is simply given antibodies from an external source. – ½	2
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20	Draw a diagram of L.S of an anatropous ovule- 1 Labelling- ½ + ½	2						
21	<p><u>Attempt either option A or B.</u></p> <p>A.</p> <p>(i) most widely used plasmids that function as a cloning vector in genetic engineering- ½</p> <p>(ii) To code for proteins involved in plasmid replication- ½</p> <p>(iii) Transformants, recombinants- ½ + ½</p> <p style="text-align: center;">OR</p> <p>B. (i) DNA is negatively charged and is pulled toward the positive electrode - 1</p> <p>(ii) Ethidium bromide, uv light- ½ + ½</p>	2						
Section – C								
22	<p>(i) X- viral DNA, Y- New viral DNA produced by infected cell- ½ + ½</p> <p>(ii) Macrophage- ½</p> <p>(iii) Any two modes- ½ + ½</p> <p>(iv) Role- ½</p>	3						
23	<p>hnRNA, or heterogeneous nuclear RNA, is the precursor to mature messenger RNA (mRNA) in eukaryotic cells. – ½</p> <p>splicing (removing non-coding introns), 5' capping (adding a modified guanosine triphosphate to the 5' end), and 3' polyadenylation (adding a tail of adenine nucleotides to the 3' end). – 1 ½</p> <p>(i) Image- 1</p>	3						
24	<p>(i) Incomplete dominance- 1</p> <p>(ii) Cross-1</p> <p>(iii) This pattern deviates from the Mendelian law of dominance -1</p>	3						

25	(i) Any two reasons- $\frac{1}{2} + \frac{1}{2}$ (ii) Any two techniques- 1+1	3
26	(i) Part A hormones are secreted by the pituitary gland , and Part B hormones are secreted by the ovaries . $\frac{1}{2} + \frac{1}{2}$ (ii) Between days 6 and 15 of the menstrual cycle, the hormones from the ovaries, primarily estrogen, cause the uterine lining to thicken and proliferate, preparing it for a potential pregnancy. – 1 (iii) If the ovum is fertilized, the corpus luteum continues to produce progesterone to maintain the uterine lining for pregnancy.- $\frac{1}{2}$ If the ovum is not fertilized, the corpus luteum degenerates into a scar tissue called the corpus albicans- $\frac{1}{2}$	3
27	(i) X is the post-reproductive group (older individuals), Y is the reproductive group, and Z is the pre-reproductive group (younger individuals). $\frac{1}{2} \times 3$ (ii) Expanding, stable, declining- $\frac{1}{2} \times 3$	3
28	(i) The birds were found on the Galápagos Islands, which are located about 600 miles west of Ecuador in the Pacific Ocean. -1 (ii) The phenomenon responsible for the diverse species is adaptive radiation, which is the process where a single ancestral species rapidly diversifies into new species that are adapted to different environments and food sources.-1 (iii) Darwin visited the area by sea voyage on the ship HMS Beagle . -1	3
Section – D		
29	A. The two peaks represent the body's response to a primary and a secondary exposure to the same pathogen (1) B. The difference in peak size is due to the presence of memory cells. After the first exposure (primary response), the body creates memory B-cells that are specific to the pathogen. Upon a second exposure (secondary response), these memory cells quickly recognize the pathogen and generate a much larger and faster antibody response, resulting in a higher antibody peak compared to the initial response. (2) <u>Attempt either subpart C or D.</u> C. B-lymphocytes and T-lymphocytes. (1) OR D. The type of antibody produced in response to allergens is IgE (immunoglobulin E). (1)	4

30	<p>A.</p> <p>1. Autogamy (pollen transfer within the same flower) and</p> <p>2. Geitonogamy (pollen transfer between different flowers on the same plant) ($\frac{1}{2} + \frac{1}{2}$)</p> <p>B.</p> <p>(i) Water lily: Pollination is accomplished by wind or insects. The flowers emerge above the surface of the water to attract these agents for pollen transfer.</p> <p>(ii) Vallisneria: Pollination is accomplished by water. (1+1)</p> <p><u>Attempt either subpart C or D.</u></p> <p>B. Any one (1)</p> <p>OR</p> <p>C. Any two- $\frac{1}{2} + \frac{1}{2}$</p>	
Section – E		
31	<p>(i) A - Motor, B - Foam breaker, C - Flat bladed impeller, and D - Acid/base for pH control. – $\frac{1}{2} \times 4$</p> <p>(ii) β-Galactosidase is considered a better selectable marker because it allows for a simple, single-step visual screening method (blue-white screening) to identify recombinant colonies, which is much faster and less cumbersome than using antibiotic resistance markers that often require multiple antibiotic plates. This is achieved through insertional inactivation- 2</p> <p>Thermus aquaticus- $\frac{1}{2}$, Thermo stable- $\frac{1}{2}$</p> <p style="text-align: center;">OR</p> <p>(i) <i>Agrobacterium tumefaciens</i> transforms plant cells into tumors by transferring a segment of its tumor-inducing (Ti) plasmid, called the T-DNA, into the plant cell's nucleus. The T-DNA contains genes that cause the plant cells to produce hormones that lead to uncontrolled cell division and to create opines, which are food for the bacteria. – 2</p> <p>(ii) A DNA probe is a small, single-stranded piece of DNA or RNA- $\frac{1}{2}$</p> <p>that is labeled and used to detect the presence of a complementary nucleic acid sequence.- $\frac{1}{2}$</p> <p>(iii) EcoRI acts on DNA by recognizing and binding to the specific palindromic sequence 5'-GAATTC-3'. It then cuts both strands of the DNA molecule between the G and A nucleotides, creating "sticky ends" that have a short, single-stranded overhang of 5'-AATT-3'. – 2</p>	5

32	<p>(i) exponential growth and logistic growth- $\frac{1}{2} \times 2$, Image- 1+1 (ii) any two special adaptations evolved in parasites.- $\frac{1}{2} \times 2$ (iii) two species cannot coexist indefinitely if they occupy the exact same ecological niche and compete for the same limiting resources.-1</p> <p style="text-align: center;">OR</p> <p>(i) The naturalist was Alexander von Humboldt. – $\frac{1}{2}$</p> <p>His key observation was that within a given region, species richness increases as the explored area increases, but only up to a certain limit. – 1</p> <p>(ii) (i) 0.1 and 0.2,- small area (ii) 0.6 and 1.2 – large area like continent- $\frac{1}{2} + \frac{1}{2}$ (iii) 'Z' – slope of the line- $\frac{1}{2}$ (iv) David Tilman's experiment (2 points).- 1+1</p>	5
33	<p>(i) Two strains of the bacterium <i>Streptococcus pneumoniae</i>: a rough, non-pathogenic strain (R) and a smooth, pathogenic strain (S). – 1 (ii) The S strain refers to the smooth, pathogenic strain that is surrounded by a protective polysaccharide capsule, while the R strain refers to the rough, non-pathogenic strain that lacks this capsule. – $\frac{1}{2} + \frac{1}{2}$ (iii) Griffith explained the transformation by proposing that some "transforming principle" from the heat-killed S strain was transferred to the live R strain, causing the R strain to develop the capsule and become pathogenic-1 (iv) The biochemical nature of this principle was determined by Avery, MacLeod, and McCarty, who showed that DNA was the transforming agent by demonstrating that enzymes that destroy DNA (DNases) prevented the transformation, whereas enzymes that degrade proteins (proteases) did not- 2</p> <p style="text-align: center;">OR</p> <p>(i) Fully processed hnRNA (messenger RNA, or mRNA) is made from a primary transcript through three steps: capping (adding a methylguanosine cap to the 5' end), splicing (removing introns and joining exons), and tailing (adding a poly-A tail to the 3' end). This processing occurs in the nucleus before the mRNA is exported for translation.- 1+1+1</p> <p>(ii) RNA polymerase I transcribes rRNA, which forms the ribosomal structure where proteins are synthesized, while RNA polymerase III transcribes tRNA, the "adaptor" molecule that brings amino acids to the ribosome. Without functional rRNA, ribosomes cannot form, and without functional tRNA, amino acids cannot be delivered to the ribosome to be assembled into a polypeptide. – 1+1</p>	5
