PRE-BOARD EXAMINATION 2025-26
MARKING SCHEME
SET 3

CLASS : XII **Subject : Biology (044)**

Q. No.	Questions	Marks
	Section – A	
1	C.2 polar nuclei + 1 male gamete nucleus	1
2	B.egg, embryo sac, nucellus, integument	1
3	C.Secondary spermatocytes have 23 chromosomes and undergo second meiotic division.	1
4	B.G 17%, A 33%, T 33%	1
5	D.Autosomal dominant, Myotonic dystrophy	1
6	B.A- (ii), B- (iii), C- (iv), D- (i)	1
7	A. Morphine	1
8	C.passive immunity	1
9	B. Genetic drift is absent.	1
10	C.A -Endothecium, B- Middle layer, C -Tapetum	1
11	B.5′ (upstream) end and 3′ (downstream) end, respectively of the transcription unit	1
12	C.analogous organs that have evolved due to convergent evolution	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	A. Both A and R are true and R is the correct explanation of A	1
	Section – B	
17	**A.** (i) Passive immunization.- antivenom injection or maternal antibodies passed to a newborn- ½ (ii) Anti- histamine- allergic reactions, such as hay fever, by blocking the action of histamine.- ½ (iii) Colostrum- first milk produced by mammals and is rich in maternal antibodies that provide passive immunity to newborns.- ½ (iv) Cytokine- barrier- infected cells release interferons to prevent viruses from spreading to neighboring cells. – ½ OR	2 1+1

	B. **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	
18	Attempt either option A or B. A. (i) most widely used plasmids that function as a cloning vector in genetic engineering- ½ (ii) To code for proteins involved in plasmid replication- ½ (iii)Transformants, recombinants- ½ + ½ **OR** B. (i) DNA is negatively charged and is pulled toward the positive electrode - 1 (ii) Ethidium bromide, uv light- ½ + ½	1+1
19	(i) Apomixes- 1 (ii) Any one use- 1	2
20	(i) Lactose/allolactose- ½ (ii) binding of the inducer results in the "switching on" of the operon. -1 (iii) Transacetylase – ½	2
21	(i) Tilman found that plots with more species showed less year-to-year variations in total biomass. He also showed that increased diversity contributed to higher productivity. Thus he established that the stability of a community depends on its species richness.- 1 (ii) Any two example- ½ + ½	2
	Section – C	
22	hnRNA, or heterogeneous nuclear RNA, is the precursor to mature messenger RNA (mRNA) in eukaryotic cells. – ½ 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 Image- 1	3
23	(i) Incomplete dominance- 1 (ii)Cross-1 (iii) This pattern deviates from the Mendelian law of dominance -1	3
24	(i)Any two reasons- ½ + ½ (ii) Any two techniques- 1+1	3

25	(i) Part A hormones are secreted by the pituitary gland, and Part B hormones are secreted by the ovaries. ½ + ½ (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 (ii) If the ovum is fertilized, the corpus luteum continues to produce progesterone to maintain the uterine lining for pregnancy.- ½ If the ovum is not fertilized, the corpus luteum degenerates into a scar tissue called the corpus albicans- ½	3
26	(i) X is the post-reproductive group (older individuals), Y is the reproductive group, and Z is the pre-reproductive group (younger individuals). ½ x 3 (ii) Expanding,stable, declining- ½ x 3	3
27	(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
28	**(i)** A: sludge- ½ B. Digester-½ C.Dung water-½ D. Gas holder-½ (ii) because this stage relies on naturally occurring microorganisms, like bacteria and fungi, to break down and consume organic matter in wastewater.-1	3
	Section – D	
29	A. Viral protein coat- 1 B. Macrophages, T-helper lymphocytes- 1+1 C. B-Reverse transcriptase, C- Viral RNA- ½ + ½ OR D. Any one method-1	4

30	A. **1. Autogamy** (pollen transfer within the same flower) and **2. Geitonogamy** (pollen transfer between different flowers on the same plant) (½ + ½) B. (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. (ii) **Vallisneria**: Pollination is accomplished by **water**. (1+1) **<u>Attempt either subpart C or D.</u>** B. Any one (1) OR C. Any two- ½ + ½	
	Section – E	
31	(i) exponential growth and logistic growth- ½ x 2 , Image- 1+1 (ii) any two special adaptations evolved in parasites.- ½ x 2 (iii) two species cannot coexist indefinitely if they occupy the exact same ecological niche and compete for the same limiting resources.-1 **OR** (i) The naturalist was **Alexander von Humboldt**. – ½ 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 (ii) (i) 0.1 and 0.2,- small area (ii) 0.6 and 1.2 – large area like continent- ½ + ½ (iii) 'Z' – slope of the line- ½ (iv) David Tilman's experiment (2 points).- 1+1	5
32	(i) Two strains of the bacterium *Streptococcus pneumoniae*: 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. – ½ + ½ (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 **OR**	5

	(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 (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	
33	(i) a naturally occurring bacterium that produces insecticidal proteins toxic to specific pests, while being safe for humans and beneficial insects. This makes it a valuable, targeted biological control agent that reduces reliance on broad-spectrum chemical pesticides- 2 (ii) The *ori* sequence directs the host cell's DNA polymerase to initiate replication, allowing the vector to multiply and maintain a high copy number. Without it, the vector would not be able to replicate and would be lost as the host cells divide- ½ + ½ (iii) *Agrobacterium tumefaciens* transforms a normal plant cell into a tumor by transferring a segment of its own DNA, known as T-DNA (transfer DNA), into the host plant's genome- 2 **OR** (i) Earlier insulin was extracted from the pancreas of slaughtered cattle and pigs, but this is no longer common because it could cause allergic reactions and other issues for some patients due to the foreign protein. -1 **(ii)** Eli Lilly used recombinant DNA technology to produce human insulin by inserting the DNA sequences for human insulin's A and B chains into E. coli bacteria.-2 **(iii)** The insulin produced by the human body is different from the synthetic insulin in that it contains a C-peptide that is removed during maturation, while the synthetic version is a fully matured hormone, ready for injection. -2	5

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