SOLUTIONS

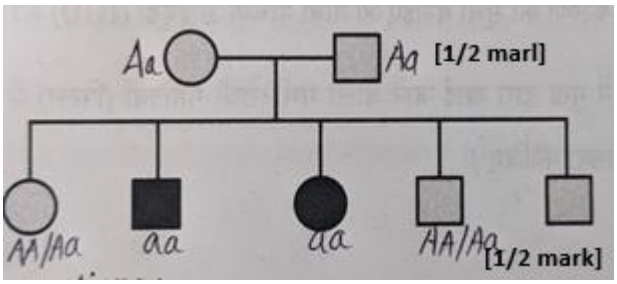
Senior Secondary School Examination, 2025

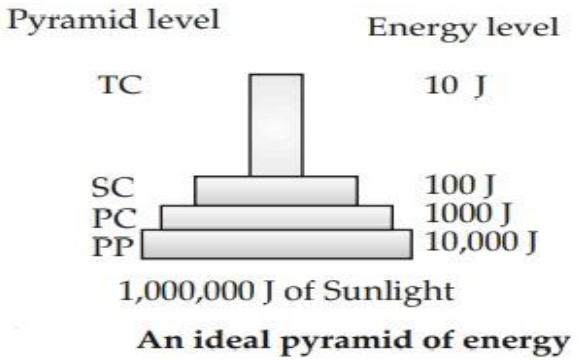
BIOLOGY (Subject Code–044)

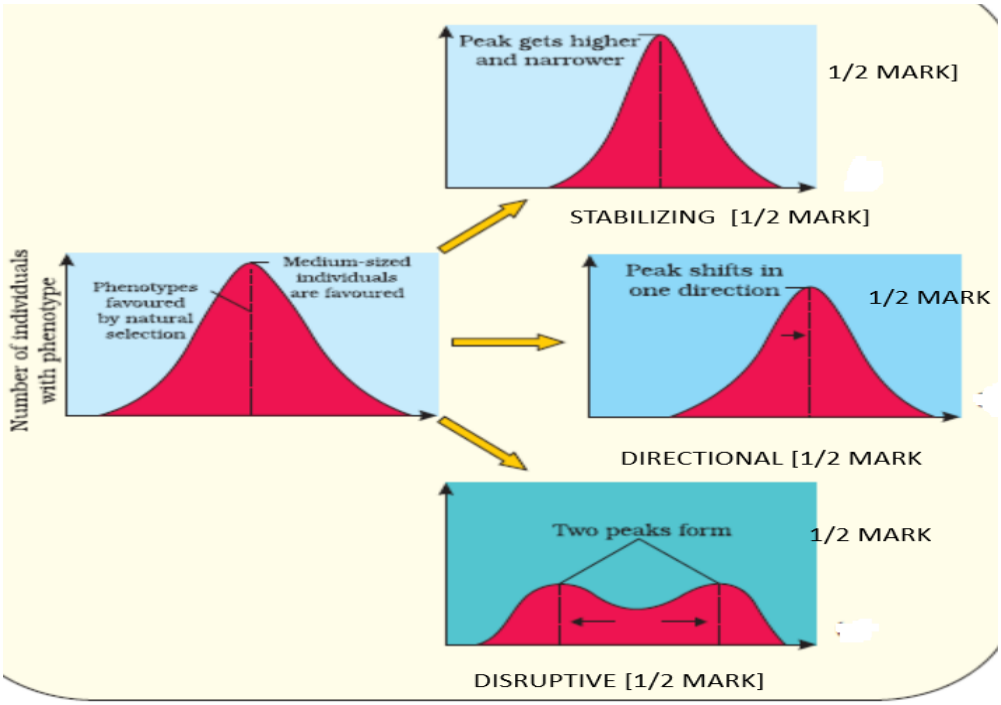
[Paper Code: 57/2/1]

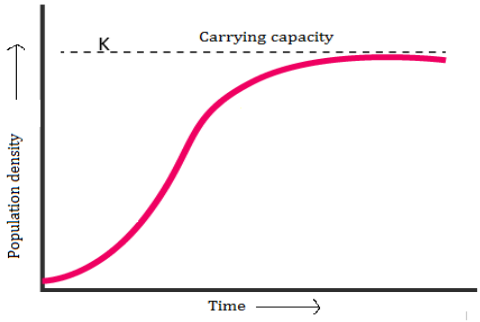
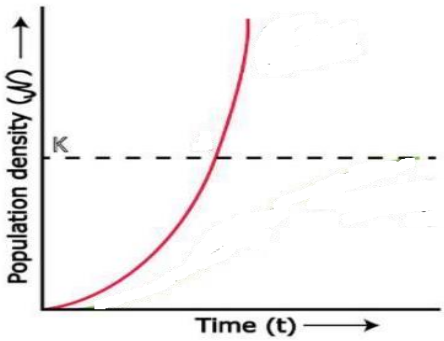
Maximum Marks:70

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION—A		
1	(B) / I-Pericarp, II-Endosperm, III-Coleorhiza	1	1
2	(B) / 22	1	1
3	(C) / Father-I^BI, Mother-I^AI^B, Child- I^Ai	1	1
4	(C) / mating between relatives (consanguineous mating)	1	1
5	(B) / (iii), (i), (ii), (iv)	1	1
6	(B) / phosphate group and OH of 5'C of a nucleoside	1	1
7	(D) / 7,8	1	1
8	(D) / (A)-(i), (B)-(iii), (C)-(ii)	1	1
9	(A) / *Aspergillus niger*	1	1
10	(B) / 0 : 1 : 3	1	1
11	(D) / Plasmid DNA acts as vector to transfer the piece of DNA attached to it.	1	1
12	(B) / Decrease in antibodies // (D) / increase in antigens	1	1
13	(A) / Both (A) and (R) are true, and (R) is the correct explanation of (A).	1	1
14	(C) / (A) is true, but (R) is false.	1	1
15	(A) / Both (A) and (R) are true, and (R) is the correct explanation of (A).	1	1
16	(C) / (A) is true, but (R) is false.	1	1
	SECTION B		
17	(A) (i)The moisture content becomes reduced and the seeds became relatively dry ,the metabolic activity of the embryo slows down (dormancy). (ii) *Lupinus arcticus* / Lupine **OR** (B) (i) Pea flowers are cleistogamous/ shows autogamy/ carry out self pollination. (ii) P- haploid/n , Q- diploid/2n	½ +½ 1 1 ½ +½	2

18	(a) Autosomal recessive trait Normal carrier parents / Heterozygous individuals , transfer defective gene to both male and female progeny producing affected individuals or homozygous recessive individuals //  (b) Sickle cell anaemia / Cystic fibrosis / Phenylketonuria / Thalassemia / or any other example **(any one)**	½ ½ +½ ½	2
19	(A) -In case of snakebite, quick response is required as natural production of antibodies will take more time therefore preformed antibodies against the snake venom are injected. -In tetanus, preformed antibodies are directly injected because quick immune response is required against deadly microbes. **(Or any other relevant example)** **OR** (B) The symptoms do not appear immediately as parasite initially multiply within the liver cells, and then attack RBCs, resulting in their rupture and, release toxic substance haemozoin.	½+½ ½+½ ½ x4	2
20	(a) EcoRI (b) 5′ CAG 3’ / 3′ GTCTTAA 5′ 5′ AATTCTTA 3′ / 3′ GAAT 5′ **(Any relevant representation)** (c) Ends are called as sticky ends because they form hydrogen bonds with their complementary cut counterparts.	½ ½+½ ½	2

21	(A) Expanding age pyramid. The number of individuals in the pre-productive age group is more than that in the reproductive age group, Number of Post reproductive individuals are less than reproductive individuals. OR (B) (i)  **An ideal pyramid of energy** **[½ mark for correct pyramid, ½ mark for correct trophic level, ½ mark for correct representation of energy levels]** (ii) 10J	1 ½ ½ ½ x3 ½	2
	SECTION – C		
22.	(a) 3200 male gametophyte (b) -Intine made up of cellulose, and pectin. -Exine made up of sporopollenin.	1 ½+½ 1	3
23	(a) Copper releasing IUDs release copper ions that supress sperm motility, Supress the fertilising capacity of sperms, increase phagocytosis of sperms **(any two)** (b)The oral pills inhibit ovulation and implantation / It alter the quality of cervical mucus to prevent or retard the entry of sperms.	1+1 1	3

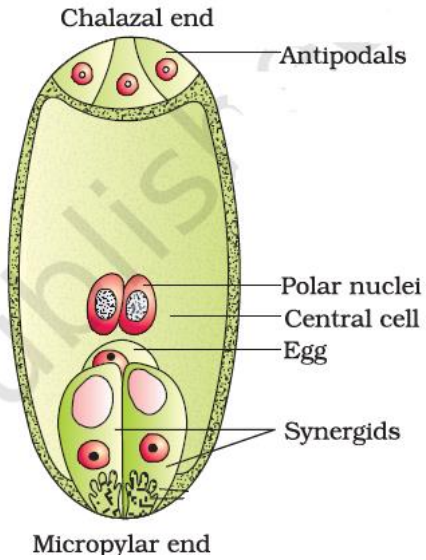
24	Cross - 1 GG × Gg [½+½] Homozygous dominant female — Heterozygous male Gamete G G — G g [½] F1 G | G | g G | GG | Gg [1] G | GG | Gg All dominant progenies are produced [½] // Cross - 2 gg × Gg [½+½] Homozygous recessive female — Heterozygous male g g — G g [½] F1 G | g g | Gg | gg [1] g | Gg | gg 50% dominant & 50% recessive Progenies are produced [½]	½+½ ½ 1 ½ ½+½ ½ 1 ½	3
25	 **(Correct diagram with labelling or correct explanation with diagram to be considered)**	½ × 6	3

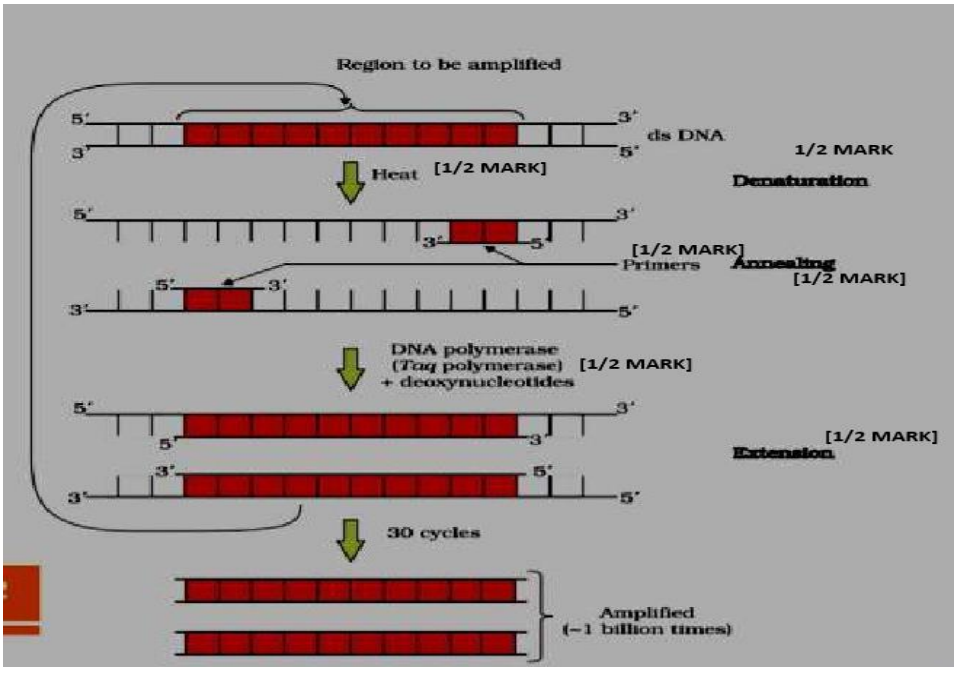
26	(a) Sportspersons abuse certain drugs to increase their muscle strength and bulk and aggressiveness for better performance in sports. (b) Cocaine/coca alkaloids , cannabinoids , any other correct example **(any two)** (c) *Erythroxylum* , *Cannabis* ,any other correct example **(any two)**	1 ½+½ ½+½	3
27	(a) Insulin synthesized in our body as prohormone (proinsulin) which contain extra stretch of C-peptide apart from A and B peptide, Eli Lilly company synthesized insulin in functional form with only two peptide A and B. (b) Insulin from animal sources caused some allergy or other type of immune reactions to the foreign protein / Insulin can be easily obtained in large quantity from bacteria	1+1 1	3
28	(a)  (b) - Verhulst-Pearl logistic growth/ Logistic growth curve/ Sigmoid growth curve -Since resource for growth for most animal populations are finite and become limiting sooner or later. (c)  	1 ½ ½ ½	

	Equation : $\frac{dN}{dt} = rN$ / $\frac{dN}{dt} = (b-d)N$ / $N_t = N_0 e^{rt}$	½	3
	SECTION-D		
29	(a) B-lymphocytes , and T-lymphocytes. (b) Because the antibodies are found in the blood hence antibody-mediated immunity is also called humoral immune response. (c) (i) Our immune system is able to distinguish between 'self' and 'non-self' cells/molecules. (ii) Cell-mediated immune response , T-lymphocytes are involved. **OR** (d)	½ +½ 1 1 ½ +½	4

Active immunity	Passive immunity	
When antibodies are produced by B-cells within the body.	Preformed antibodies are injected into the body for defence	1
It is produces comparatively slow response	It provides quick response	1

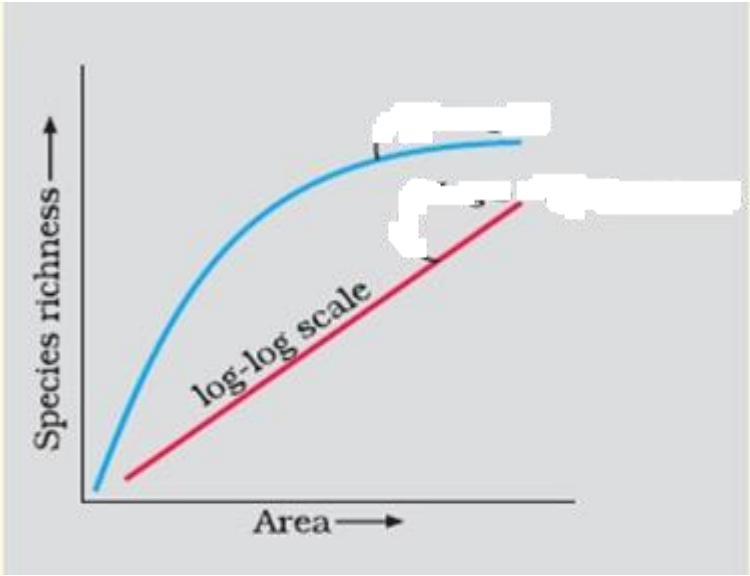
30	(a) DNA -dependent RNA polymerase (b) B-coding strand, A-Template strand (c) - C is promoter, it is the sequence of DNA where the enzyme DNA dependent RNA polymerase binds for initiation of transcription. - D is the terminator, it is the sequence of DNA where the process of transcription terminated.	1 ½+½ ½+½ ½+½	

	OR (d) - C is located towards 5′ end (upstream) of coding strand - D is located towards 3′ end (downstream) of coding strand	 1 1	 4
	SECTION E		
31	(A) (i) Megaspore mother cell (2n) —(Meiosis)→ Tetrad (n) Tetrad (n) → Degeneration of 3 cells (one functional megaspore left) (n) Degeneration of 3 cells ← 3 Mitosis without cell wall formation / Free Nuclear division 8 nuclear stage —(Cell wall formation)→ Embryo sac (7 celled 8 nucleated stage) (ii)  **(Any four correctly labelled parts)** **OR** (B) (i) Menstrual phase → proliferative / follicular phase → ovulatory phase → luteal / secretory phase. (ii) 3 – 5 days.	½ × 6 ½ × 4 ½ x4 ½	

	(iii) - Estrogen reaches its peak during proliferative phase just before ovulation, because it is secreted by the growing follicles. - Progesterone reaches its peak during luteal phase or secretory phase, it is because progesterone is secreted by corpus luteum. (iv) LH surge induces rupture of Graafian follicle / the release of ovum /ovulation.	½+½ ½+½ ½	5
32	(A) (i) A bacterial cell is made competent by treating it with a specific concentration of a divalent cation such as calcium, which increases the efficiency with which DNA enters the cell through pores in its cell wall. (ii) -**Denaturation** , DNA is heated to a high temperature resulting in the separation of two strands of DNA -**Annealing** , two primers are annealed to each of the single-stranded template DNA. -**Extension** , enzyme Taq polymerase extends the primers using the nucleotides provided in the reaction and the genomic DNA as template. //  	1+1 ½+½ ½+½ ½+½	

	OR (B) (i) Transgenic animals : Animals that have had their DNA manipulated to possess and express an extra (foreign) gene are known as transgenic animals. (ii) Common reasons to produce transgenic animals are : -**Normal physiology and development** , Transgenic animals can be specifically designed to allow the study of how genes are regulated and how they affect the normal functions of the body and its development. -**Study of disease** , Many transgenic animals are specially made to serve as models for human diseases so that investigation of new treatments for diseases is made possible. -**Biological products** , Transgenic animals that produce useful biological products can be created -**Vaccine safety** , Transgenic mice are being developed for use in testing the safety of vaccines before they are used on humans. -**Chemical safety testing** , Transgenic animals are made that carry genes which make them more sensitive to toxic substances than non-transgenic animals. **(Any Four)**	1 ½+½ ½+½ ½+½ ½+½	5
33	(A) (i) -Tropical latitudes have remained relatively undisturbed for millions of years and thus had a long evolutionary time for species diversification -Tropical environments are less seasonal more constant and predictable. Such constant environments promote niche specialisation and lead to a greater species diversity -More solar energy is available in the tropics which contributes to higher productivity which leads to greater species diversity.	1 1 1	

(ii)



1

- Alexander von Humboldt ½
- Within a region species richness increased with increasing explored area but only up to a limit. ½

OR

(B)

(i)

-Habitat loss and fragmentation, Deforestation leads to habitat loss and ultimately causing extinction of animals and plants / When large habitats are broken into small fragments that also leads to population decline / mammals and birds with large territories and certain animals with migratory habits are badly affected. ½ +½

- **Overexploitation**, overexploitation of natural resources by humans leads to extinction of many species / For example overexploitation of Steller's sea cow or passenger pigeon or many marine fishes led to their extinction. ½ +½

-**Alien species invasions**, When alien species are introduced unintentionally or deliberately for whatever purpose some of them turn invasive and cause decline or extinction of indigenous species/ For example *Parthenium* or *Lantana* or water hyacinth pose threat to indigenous species (or any other correct example) ½ +½

	-Co-extinctions, When a species becomes extinct the plant and animal species associated with it in an obligatory way also became extinct/ For example unique assemblage of parasites and plant pollinator mutualism where extinction of one invariably leads to the extinction of the other **(any three points)**	½ +½	
	(ii) - Ex-situ conservation : Threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care. - e.g. : Zoological parks, Botanical gardens, Wildlife safari parks, seed banks**,** pollen bank **(any two or any other relevant examples)**	1 ½ +½	5