SOLUTIONS

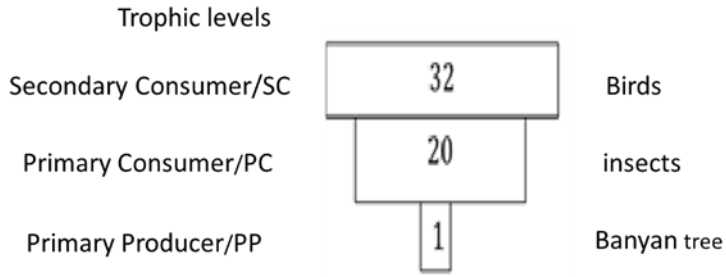
Senior Secondary School Examination, 2025

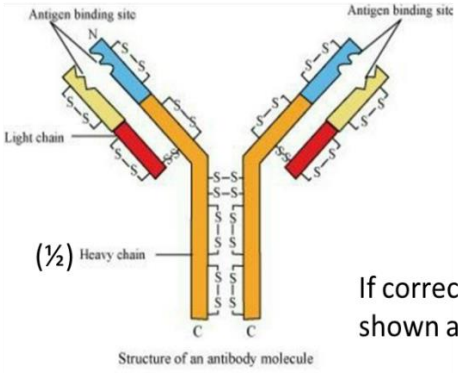
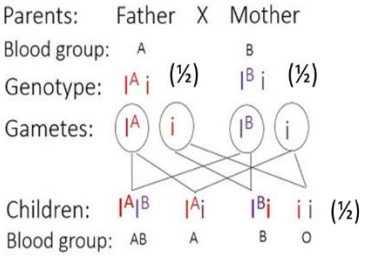
BIOLOGY (Subject Code-044)

[Paper Code: 57/5/2]

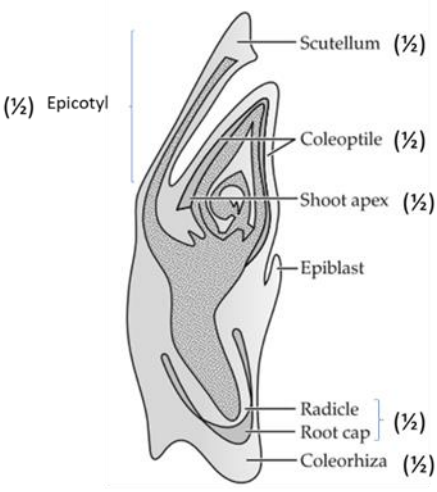
Maximum Marks: 70

Q.NO.	EXPECTED ANSWER/ VALUE POINTS	Marks	Total Marks
	SECTION A		
1.	(B) / Euchromatin	**1**	**1**
2.	(C) / (ii), (iv) and (v)	**1**	**1**
3.	(C) / Sequence Annotation	**1**	**1**
4.	(D) / aa	**1**	**1**
5.	(C) / Thymus	**1**	**1**
6.	(D) / Autogamy, but not Geitonogamy	**1**	**1**
7.	(D) / Lemur – Spotted cuscus	**1**	**1**
8.	(B) / Lysozyme	**1**	**1**
9.	(A) / a-(ii), b-(iii), c-(iv), d-(i)	**1**	**1**
10.	(C) / β- galactosidase	**1**	**1**
11.	(B) / *Aspergillus sp.*	**1**	**1**
12.	(B) / 30%	**1**	**1**
13.	(C) / Assertion (A) is true, but Reason (R) is false.	**1**	**1**
14.	(D) / Assertion (A) is false, but Reason (R) is true.	**1**	**1**
15.	(D) / Assertion (A) is false, but Reason (R) is true.	**1**	**1**
16.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	**1**	**1**
	SECTION B		
17.	(a) *Taq* polymerase (b) It forms overhanging stretches called sticky ends, which facilitates hydrogen bond formation with their complementary cut parts by DNA ligase. (c) *Escherichia coli*/*E.coli*	½ ½+½ ½	**2**

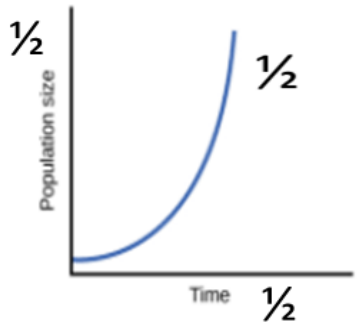
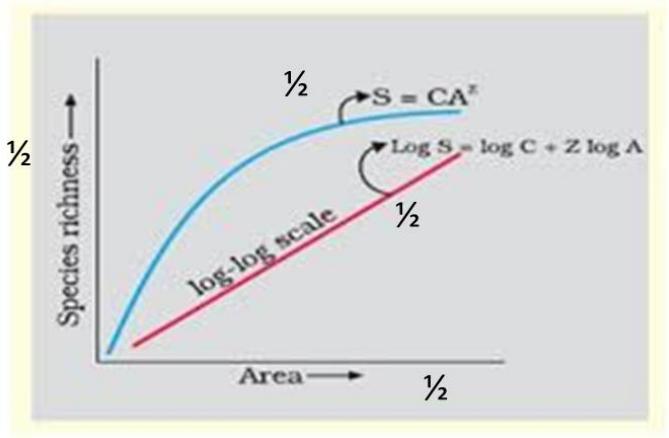
18.	(a) • Amniocentesis *:* Some of the amniotic fluid of the developing foetus is taken to analyse the fetal cells and dissolved substances. • Misuse *:* Sex-determination of foetus which lead to increase in female foeticide **OR** (b) • Gonorrhoea, chlamydiasis, genital warts, trichomoniasis, syphilis, genital herpes, hepatitis-B, AIDS **(Any two diseases)** Pelvic inflammatory diseases (PID), abortions, still births, ectopic pregnancies, infertility or even cancer of the reproductive tract **(Any two complications)**	**1** **1** **½+½** **½+½**	**2**
19.	(a) Fig species can be pollinated only by its 'partner' wasp species and no other species, the female wasp uses the fruit not only as an oviposition (egg-laying) site, but also uses the developing seeds within the fruit for nourishing the larvae, the wasp pollinates the fig inflorescence while searching for suitable egg-laying site. **OR** (b) Ecological pyramid of number.  1 mark for correct Trophic levels 1 mark for correct diagram of Inverted pyramid of number	**½ x4** **1+1**	**2**
20.	(a) - Diagram (ii) is the correct replicating fork - The DNA – dependent DNA polymerase catalyse polymerisation only in one direction, that is 5′→3′ - On one template strand with polarity 3′→ 5′ DNA synthesis is continuous and on other template strand with polarity 5′→3′ DNA replication is discontinuous. (b) DNA ligase	**½** **½** **½** **½**	**2**
21.	(a)-Each antibody molecule has four peptide chains/an antibody molecule is represented as H_2L_2 -Two small chains called light chains -two longer chains called heavy chains -It has an antigen binding site at N end (amino end) - It has disulphide bond between different parts of proteins or proteins of different chains **(Any four points)**	**½ x4**	

	//  Structure of an antibody molecule If correct disulphide bond is shown award ½ mark **OR** (b) - Ensuring availability of HIV free blood in blood banks - Ensuring the use of only disposable needles and syringes in public and private hospitals and clinics - Free distribution of condoms. - Controlling drug abuse. - Advocating safe sex. - Promoting regular check-ups for HIV in susceptible populations. - Preventing infection during blood transfusions in patients. - Monitoring of pregnant women for HIV **(Any four Measures)**	**½ x4** **½ x4**	**2**
	SECTION C		
22.	• The Amazon rain forest is being cut and cleared for cultivating soya beans or for conversion of grasslands for raising beef cattle which threaten survival of many species. • When large habitats are broken up into small fragments mammals and birds requiring large territories, and certain animals with migratory habits are badly affected leading to their extinction or population decline.	**1** **1+1**	**3**
23.	(a) Three alleles (b) Co-dominance. (c) Yes, they can have a child with 'O' blood group  	**½** **½** **½** **½ x3**	**3**

24.	The signals of parturition originate from the fully developed fetus and the placenta, which induce mild uterine contractions called fetal ejection reflex, this triggers release of oxytocin from the maternal pituitary, Oxytocin acts on the uterine muscles and causes stronger uterine contractions, which in turn stimulates further secretion of oxytocin, the stimulatory reflex between the uterine contraction and oxytocin secretion continues resulting in stronger and stronger contractions which leads to expulsion of the baby out of the uterus through the birth canal.	**½ x6**	**3**
25.	(a) The given type of pollination prevents inbreeding depression/ prevents loss of fertility/promote hybrid vigour/ improve genetic variability (b) - The plant will not show geitonogamy - because in this flowering plant pollen release and stigma receptivity are not synchronised/as the flowers are present on different plants.	**1** **1** **1**	**3**
26.	• Sickle cell anaemia or Thalassemia • It is determined by alteration or mutation in the single gene, these are transmitted to the offspring on the same line as studied by Mendel in garden pea, Mendelian disorders can be traced in a family by the pedigree analysis**.** **(Any two points)** • It is transmitted from parents to offspring when both the partners are carriers/heterozygous for the disease.	**1** **½+½** **1**	**3**
27.	(a) BOD – Biochemical Oxygen Demand (b) • The amount of the oxygen that would be consumed if all the organic matter in 1 litre of water were oxidised by bacteria. • The greater the BOD of waste water more is its polluting potential	**1** **1** **1**	**3**
28.	- Made crops more tolerant to abiotic stresses (cold, drought, salt, heat). - reduced reliance on chemical pesticides (pest resistant crops). - helped to reduce post-harvest losses. - increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil). - enhanced nutritional value of food (eg. golden rice i.e. vitamin 'A' enriched rice). - tailor-made plants to supply alternative resources to industries in the form of starches, fuels and pharmaceuticals. **(Any three advantages)**	**1x3**	**3**
	SECTION D		
29.	(a) 15 – 16 years or Adolescence period (12-18 years of age) (b) Clearing of forest / deforestation / Narco-deforestation / extinction of species / promotes monoculture that will further lead to loss of	**1** **1**	

	(c) (i) • Inflorescence / flower tops / leaves / resin. • Affects the cardiovascular system of the body/any other correct effect **OR** (c) (ii) - *Erythroxylum coca* - Causes hallucinations.	**1** **1** **1** **1**	**4**
30.	(a) (iii) Greater, Greater (b) (i) Divergent evolution (ii) Divergent evolution - both indicates common ancestry as in both cases cytochrome C is the respiratory pigment. (c) (i) Convergent evolution: Different structures evolving for the same function and hence having similarity. **OR** (c) (ii) Divergent evolution: Same structure developed along different directions due to adaptations to different needs.	**1** **½** **½** **1** **1** **1**	**4**
	SECTION E		
31.	(a) (i) Embryo of a monocotyledon seed has one cotyledon called scutellum, situated towards one side (lateral) of the embryonal axis at its lower end, the embryonal axis has the radical and root cap, enclosed in an undifferentiated sheath coleorhiza, The portion of the embryonal axis above the level of attachment of scutellum is epicotyl, and a few leaf primordia enclosed in a hollow foliar structure the coleoptile /  **(Marks to be allotted if the key point are depicted in the diagram in lieu of explanation.)**	**½ x6** **½ x6**	

	(ii) • Some of the Nucellar cells surrounding the embryo sac start dividing, and protrude into the embryo sac and develop into embryos. • Apomixis/Polyembryony **OR** (b) (i) - Rete testis, The seminiferous tubules of the testis open into the Vasa efferentia through rete testis - Vasa efferentia, leave the testis and open into epididymis located along the posterior surface of each testis - Epididymis, the epididymis leads to Vas deferens - Vas deferens, this ascends to the abdomen and loops over the urinary bladder. (ii) FSH acts on Sertoli cells, stimulates secretion of some factors which help in the process of spermiogenesis (which is a part of spermatogenesis).	**1** **1** **½+½** **½+½** **½+½** **½+½** **½+½**	**5**
32.	(a) (i) *Bacillus thuringiensis* produces protein crystals during a particular phase of their growth, which contain a toxic insecticidal protein, Bt toxin protein exist as inactive protoxins, to get it activated alkaline pH is not available in the bacteria. (ii) The proteins encoded by genes Cry IAc and Cry IIAb controls the cotton bollworms, these specific Bt genes were isolated from *Bacillus thuringiensis* and incorporated into the cotton plants. **OR** (b) (i) 'a' - amp^R and 'b' - tet^R (ii) - Enzyme β-galactosidase helps to differentiate recombinants from non-recombinants on the basis of their ability to produce colours in the presence of chromogenic substrate - Selection of recombinants due to inactivation of antibiotic resistance is cumbersome because it involves simultaneous plating of two plates having different antibiotics. (iii) - Cloning vectors are used to make multiple copies of the desired DNA / gene - They are used to transfer gene of interest to the host cell	**1x3** **2** **½+½** **1+1** **1+1**	**5**
33.	(a) (i) When resources in the habitat are unlimited each species has the ability to realize fully its innate potential to grow in number, the population grow in an exponential or geometric fashion, It results in a J-shaped curve when we plot population density in relation to time. (ii) $dN/dt = (b - d) xN$ / $dN/dt = rN$ / $N_t = N_0e^{rt}$	**½ x3** **½**	

	r = intrinsic rate of natural increase N = size of the population b = birth rate d = death rate	½	
	(iii) Exponential growth curve  	1 1½	
	OR		
	(b) (i)- Within a region species richness increases with increasing explored area, but only up to a limit	1+1	
	(ii) log S = log C + 2 log A / $S = CA^Z$	1	
	(iii)  	½ x4	5