

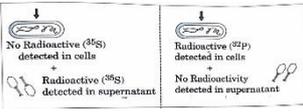
SOLUTIONS

Senior Secondary School Examination, 2025

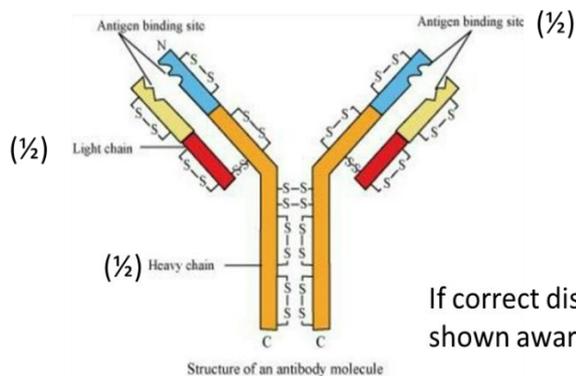
BIOLOGY (Subject Code-044)

[Paper Code: 57/5/1]

Maximum Marks: 70

Q.NO.	EXPECTED ANSWER/ VALUE POINTS	Marks	Total Marks
SECTION A			
1.	(D) / Octamer	1	1
2.	(D) / (i), (iii) and (iv)	1	1
3.	(D) / Ribonucleoside triphosphate	1	1
4.	(C) / Phenylketonuria	1	1
5.	(C) / IgA	1	1
6.	(C) / (iii) and (iv)	1	1
7.	(D) / Numbat – Anteater	1	1
8.	(B) / Chitinase	1	1
9.	(A) / Tt × tt	1	1
10.	(C) / A polypeptide of 24 amino acids will be formed.	1	1
11.	(C) / <i>Clostridium</i> sp	1	1
12.	(A) / 	1	1
13.	(D) / Assertion (A) is false, but Reason (R) is true.	1	1
14.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	1	1
15.	(C) / Assertion (A) is true, but Reason (R) is false.	1	1
16.	(D) / Assertion (A) is false, but Reason (R) is true.	1	1
SECTION B			
17.	(a)-Each antibody molecule has four peptide chains/an antibody molecule is represented as H ₂ L 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	

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If correct disulphide bond is shown award 1/2 mark

1/2 x4

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)

1/2 x4

2

18. (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

1/2

1/2

1/2

1/2

2

19. (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)**

1/2+1/2

1/2+1/2

2

20. (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*

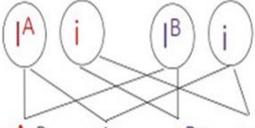
1/2

1/2+1/2

1/2

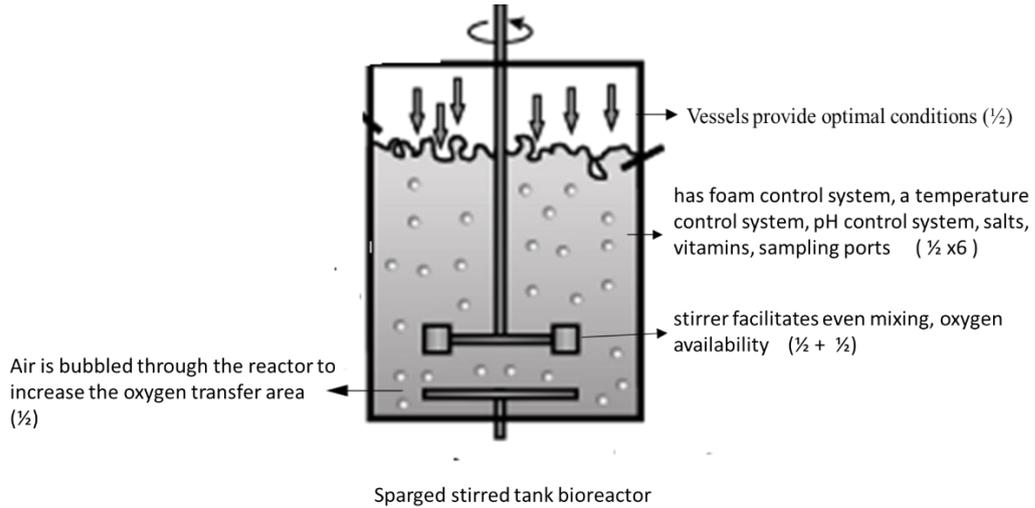
2

21.	<p>(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.</p> <p style="text-align: center;">OR</p> <p>(b) Ecological pyramid of number.</p> <p style="text-align: center;">Trophic levels</p> <table style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: right;">Secondary Consumer/SC</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">32</td> <td style="text-align: left;">Birds</td> </tr> <tr> <td style="text-align: right;">Primary Consumer/PC</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">20</td> <td style="text-align: left;">insects</td> </tr> <tr> <td style="text-align: right;">Primary Producer/PP</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">1</td> <td style="text-align: left;">Banyan tree</td> </tr> </table> <p>1 mark for correct Trophic levels 1 mark for correct diagram of Inverted pyramid of number</p>	Secondary Consumer/SC	32	Birds	Primary Consumer/PC	20	insects	Primary Producer/PP	1	Banyan tree	<p>$\frac{1}{2} \times 4$</p> <p>1+1</p>	2
Secondary Consumer/SC	32	Birds										
Primary Consumer/PC	20	insects										
Primary Producer/PP	1	Banyan tree										
SECTION C												
22.	<p>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.</p>	$\frac{1}{2} \times 6$	3									
23.	<ul style="list-style-type: none"> • Disorder is Down’s Syndrome • Symptoms: - Short statured with small round head <li style="padding-left: 20px;">- furrowed tongue <li style="padding-left: 20px;">- partially open mouth. <li style="padding-left: 20px;">- palm is broad with characteristics palm crease <li style="padding-left: 20px;">- retarded physical growth/psychomotor development/mental development. <p style="text-align: right;">(Any two symptoms)</p>	<p>1</p> <p>1+1</p>	3									
24.	<p>(a) BOD – Biochemical Oxygen Demand</p> <p>(b)</p> <ul style="list-style-type: none"> • 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 	<p>1</p> <p>1</p> <p>1</p>	3									

25.	<p>- Made crops more tolerant to abiotic stresses (cold, drought, salt, heat).</p> <p>- reduced reliance on chemical pesticides (pest resistant crops).</p> <p>- helped to reduce post-harvest losses.</p> <p>- increased efficiency of mineral usage by plants (this prevents early exhaustion of fertility of soil).</p> <p>- enhanced nutritional value of food (eg. golden rice i.e. vitamin 'A' enriched rice).</p> <p>- tailor-made plants to supply alternative resources to industries in the form of starches, fuels and pharmaceuticals.</p> <p style="text-align: right;">(Any three advantages)</p>	1x3	3
26.	<p>(a) Three alleles</p> <p>(b) Co-dominance.</p> <p>(c) Yes, they can have a child with 'O' blood group</p> <p>Parents: Father X Mother</p> <p>Blood group: A B</p> <p>Genotype: $I^A i$ ($\frac{1}{2}$) $I^B i$ ($\frac{1}{2}$)</p> <p>Gametes: I^A i I^B i</p>  <p>Children: $I^A I^B$ $I^A i$ $I^B i$ ii ($\frac{1}{2}$)</p> <p>Blood group: AB A B O</p>	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} \times 3$	3
27.	<ul style="list-style-type: none"> • 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
28.	<p>(a) The given type of pollination prevents inbreeding depression/ prevents loss of fertility/promote hybrid vigour/ improve genetic variability</p> <p>(b) - The plant will not show geitonogamy</p> <p>- because in this flowering plant pollen release and stigma receptivity are not synchronised/as the flowers are present on different plants.</p>	1 1 1	3
SECTION D			
29.	<p>(a) (iii) Greater, Greater</p> <p>(b) (i) Divergent evolution</p> <p>(ii) Divergent evolution</p> <p>- both indicates common ancestry as in both cases cytochrome C is the respiratory pigment.</p> <p>(c) (i) Convergent evolution: Different structures evolving for the same function and hence having similarity.</p>	1 $\frac{1}{2}$ $\frac{1}{2}$ 1 1	

	OR		
	(c) (ii) Divergent evolution: Same structure developed along different directions due to adaptations to different needs.	1	4
30.	<p>(a) 15 – 16 years or Adolescence period (12-18 years of age)</p> <p>(b) Clearing of forest / deforestation / Narco-deforestation / extinction of species / promotes monoculture that will further lead to loss of</p> <p>(c) (i)</p> <ul style="list-style-type: none"> • Inflorescence / flower tops / leaves / resin. • Affects the cardiovascular system of the body/any other correct effect <p style="text-align: center;">OR</p> <p>(c) (ii) - <i>Erythroxylum coca</i> - Causes hallucinations.</p>	1 1 1 1 1 1	4
	SECTION E		
31.	<p>(a)</p> <ul style="list-style-type: none"> • Animals that have had their DNA manipulated to possess and express an extra gene are known as transgenic animals. • Areas of benefits are <p>- 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 like study of complex factors involved in growth such as insulin-like growth factor.</p> <p>- Study of disease, transgenic animals are used to increase understanding of how genes contribute to the development of disease like cancer or cystic fibrosis</p> <p>- Biological products, transgenic animals that produce useful biological products can be created and the products can be used to treat diseases like (α-1-antitrypsin) human protein can be produced to treat emphysema / Rosie, produced human protein enriched milk containing alpha – lactalbumin which is a balanced product for human babies or any other examples.</p> <p>-Vaccine safety, transgenic mice are being developed for use in testing the safety of vaccines before they are used in humans like transgenic mice are being used to test the safety of the polio vaccine (or any others example)</p> <p>- Chemical safety testing, transgenic animals are modified to carry gene which make them more sensitive to toxic substances than non-transgenic animals so transgenic animals are exposed to the toxic substances and the effects studied (Any four points)</p> <p style="text-align: center;">OR</p> <p>(b) - Vessels or large containers which provide optimal conditions to produce the desired product.</p> <ul style="list-style-type: none"> - The stirrer facilitates even mixing, and oxygen availability throughout the bioreactor. - Air is bubbled through the reactor to increase the oxygen transfer area. - It has foam control system, a temperature control system, pH control system, salts, vitamins, sampling ports so that small volume of culture can be withdrawn periodically. 	1 $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} \times 6$	

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1/2x10

(Marks to be allotted if the key words are depicted in the diagram in lieu of explanation)

5

32. (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.

1/2 x3

(ii) $\frac{dN}{dt} = (b - d) \times N$ / $\frac{dN}{dt} = rN$ / $N_t = N_0 e^{rt}$

1/2

r = intrinsic rate of natural increase

N = size of the population

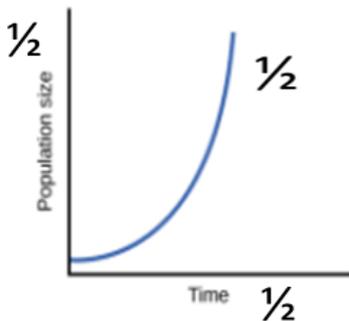
1/2

b = birth rate

d = death rate

(iii) Exponential growth curve

1



1 1/2

OR

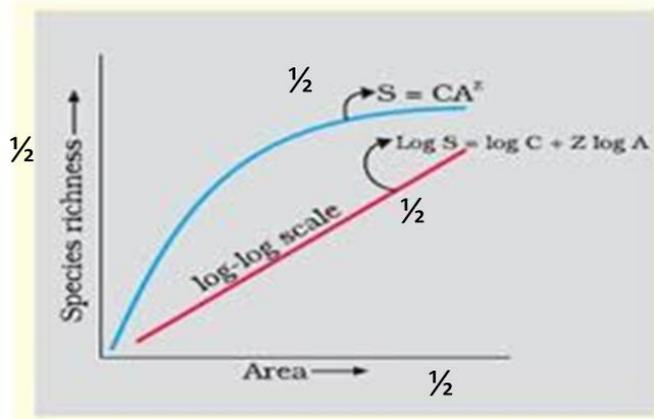
(b) (i)- Within a region species richness increases with increasing explored area, but only up to a limit

1+1

(ii) $\log S = \log C + 2 \log A$ / $S = CA^Z$

1

(iii)

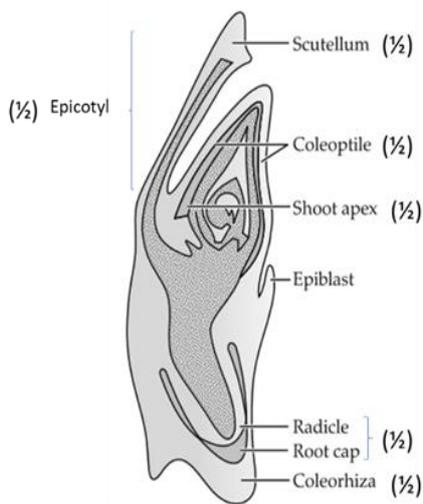


1/2 x 4

5

33. (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

/



1/2 x 6

1/2 x 6

(Marks to be allotted if the key point are depicted in the diagram in lieu of explanation.)

(ii)

- Some of the Nucellar cells surrounding the embryo sac start dividing, and protrude into the embryo sac and develop into embryos.
- Apomixis/Polyembryony

1

1

	OR		
	(b) (i) - Rete testis, The seminiferous tubules of the testis open into the Vasa efferentia through rete testis	1/2+1/2	
	- Vasa efferentia, leave the testis and open into epididymis located along the posterior surface of each testis	1/2+1/2	
	- Epididymis, the epididymis leads to Vas deferens	1/2+1/2	
	- Vas deferens, this ascends to the abdomen and loops over the urinary bladder.	1/2+1/2	
	(ii) FSH acts on Sertoli cells, stimulates secretion of some factors which help in the process of spermiogenesis (which is a part of spermatogenesis).	1/2+1/2	5