SOLUTIONS

Senior Secondary School Examination, 2025

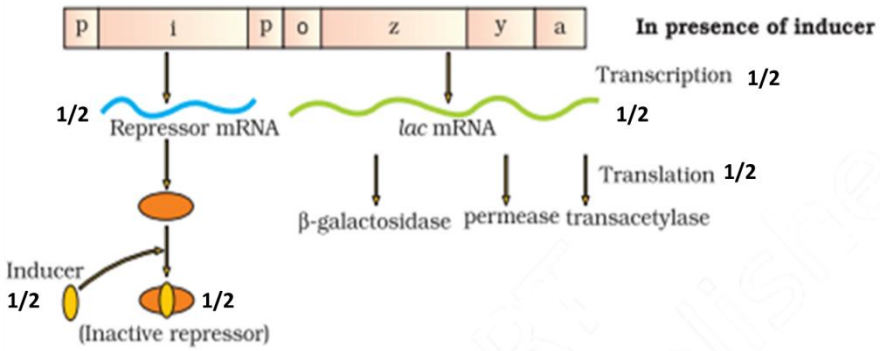
BIOLOGY (Subject Code–044)

[Paper Code: 57/6/2]

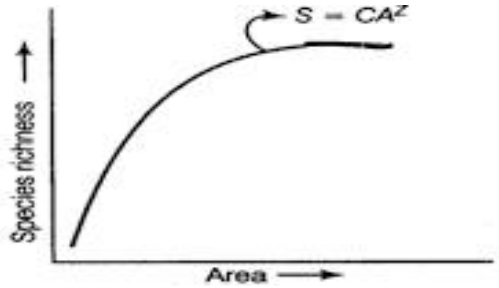
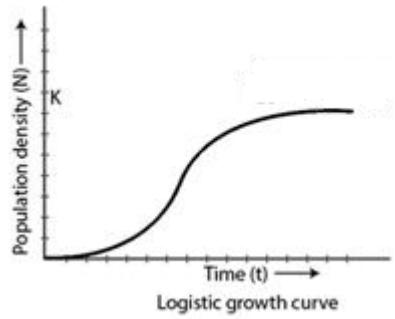
Maximum Marks:70

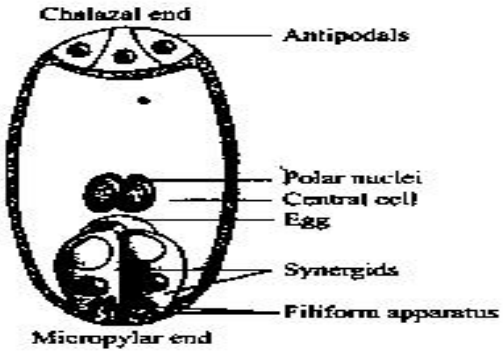
Q.N.	Expected answer/value points	Marks	Total Marks
	SECTION A		
1.	(D) / 23S rRNA	1	1
2.	(C) / 4	1	1
3.	(D) / Address the ethical, legal and social issues that may arise from the Project	1	1
4.	(C) / X-linked recessive trait	1	1
5.	(B) / (ii), (iii) and (v)	1	1
6.	(B) / 0·42	1	1
7.	(C) / 30%	1	1
8.	(B) / (ii) and (iii)	1	1
9.	(B) / Retrovirus	1	1
10.	(C) / Coelacanth	1	1
11.	(A) / Pvu II	1	1
12.	All options are incorrect so 1 mark should be awarded for attempting this question	1	1
13.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A).	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.	(B) / Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of the Assertion (A).	1	1
	SECTION B		
17	(a) six (b) ● 10 ● 0.34nm/3.4 A^{o}	½ ½ ½	

	(c) The plane of one base pair stack over the other in double helix additionally confirms stability of helical structure of DNA	½	2
18	(a) • To check indiscriminate and illegal female foeticide • First trimester/ 12 weeks/ First three month **OR** (b) • Pelvic Inflammatory disease • Human immunodeficiency Virus /HIV, Genital herpes, Hepatitis B /C **(Any two)**	1+1 1 ½ + ½	2
19	(a)One petal of *Ophrys* bear uncanny resemblance to the female of the bee in size colour and marking, male bee pseudo-copulates with the flower considering it as a female and during the process is dusted with pollen from the flower. **OR** (b) Fragmentation, leaching, Catabolism, humification, Mineralisation **(1 Mark for correct sequence)** **Humification:** It leads to accumulation of a dark coloured amorphous substance which is called humus that is highly resistant to microbial action and undergoes decomposition at an extremely slow rate.	1+1 1 1	2
20	(a) Gene cloning /Amplification (b) (i) EcoR I to cut both the plasmid and alien DNA (ii)Cutting with Same restriction enzyme will yield sticky ends at the end of both DNA which can be joined together by DNA ligase.	½ ½ 1	2
21	(a) (i) Provides antibodies/provides IgA/ provide nutrition/ Provides passive immunity (ii) Colostrum **OR** (b) (i)Allergy (ii) IgE (iii) Histamine and Serotonin	 1 1 ½ ½ ½+½	2
	Section-C		
22	(a) Sedimented bacterial flocs in settling tank is called activated sludge (b) In anaerobic sludge digester bacteria digest the bacteria and the fungi in the sludge, during this digestion bacteria produce a mixture of gases (such as methane, hydrogen sulphide and carbon dioxide)	1 1+1	3
23	(a) Self incompatibility,It is a Genetic mechanism to prevent self-pollen (from the		

	same flower or other flower of same plant) from fertilising the ovules by inhibiting pollen germination or pollen tube in the pistil / non-synchronisation of pollen release and stigma receptivity, Either the pollen is released before the stigma becomes receptive or stigma becomes receptive much before the release of pollen (b) It would have led to inbreeding depression	1+1 1	3
24	(a)The Nile perch introduced into Lake Victoria in east Africa led eventually to the extinction of an ecologically unique assemblage of more than 200 species of *Cichlid* fish in the lake, the environmental damage caused and threat posed to our native species by invasive weed species like carrot grass *(Parthenium*) or Lantana or water hyacinth *(Eicchornia*),Introduction of the African catfish *Clarias gariepinus* for aquaculture purposes is posing a threat to the indigenous catfishes in our rivers **(Any two)** (b) High degree of endemism and high level of species richness	1+1 ½ + ½	3
25	(a) female heterogamety/ ZW (b) (i) Male bird-36 (ii) ZZ (iii)Female bird -36 (iv) ZW	1 ½X4	2
26	Lactose transported into the cell through permease, in the presence of an inducer lactose the repressor is inactivated by interaction with the inducer, this allows RNA polymerase access to the promoter and transcription proceeds //  	1x3 ½ x6	3
27	(a) -Inner wall: Endometrium, endometrium undergoes cyclical changes during menstrual cycle/ thickening of endometrium is required for pregnancy -Middle layer: Myometrium, myometrium exhibits strong contraction during delivery of the baby	½+½ ½+½	

<table>
<tr><td></td><td>(b) The edges of the infundibulum in ovary possess finger-like projections called fimbriae, which help in collection of the ovum after ovulation.</td><td>½x2</td><td>3</td></tr>
<tr><td>28</td><td>(a)Produces human protein enriched milk (2.4 gm/litre), the human alpha lactalbumin is more nutritionally balanced for human babies
(b) To treat emphysema</td><td>1+1
1</td><td>3</td></tr>
<tr><td></td><td>SECTION-D</td><td></td><td></td></tr>
<tr><td>29</td><td>(a) Number of men taking treatment was higher than women/1 woman out of 18 was treated/1 man out of 7 was treated/ 1 in 11 persons was addicted to Cannabis sativa or Papaver somniferum / drug user have increased by 20%/ 292 million people were consuming drugs in 2022 (any two observations)
(b) Contaminated needles sharing between drug addicts transmits diseases like Hepatitis B and HIV. Both diseases are primarily caused by viruses.
(c) (i)Cannabis sativa
OR
(c) (ii)Papaver somniferum</td><td>½ + ½
1+1
1
1</td><td>4</td></tr>
<tr><td>30</td><td>(a) Mutation
(b) A/ Greater the evolutionary distance, greater are the differences in the nitrogenous bases/ D/ Lesser the evolutionary distance, Lesser are the differences in the nitrogenous bases
(c) (i) Divergent Evolution, As both of them diverge from same ancestor and possess homologous structure.
OR
(c) (ii)
<table>
<tr><th>Divergent Evolution</th><th>Convergent Evolution</th></tr>
<tr><td>They have different ancestor</td><td>They have common ancestor</td></tr>
<tr><td>They possess homologous structure</td><td>They possess analogous structure</td></tr>
<tr><td>Organ possesses</td><td>Organ possesses</td></tr>
</table></td><td>1
1
1+1
1+1</td><td></td></tr>
</table>

	same structure but different function	different structure but same function.	
	(Any two correct difference)		4
	SECTION-E		
31	(a) He observed that within a region species richness (the number of different species) increase with increasing area, only up to a limit	1+1	
	(ii)		
	● 	1+1	
	(1/2 mark each for both axis and 1 mark for correct graph)		
	● Z shows relationship between species richness and area/ Regression coefficient/ slope of graph	1	
	OR		
	(b) (i) A population growing in a habitat with limited resources show initially a lag phase, followed by phases of acceleration, and deceleration and finally an asymptote, when the population density reaches the carrying capacity	1/2x4	
	 Logistic growth curve	1	
	(ii) **DN/dt = rN(K-N/K)**	1	
	Where N = Population density at time t		
	r = Intrinsic rate of natural increase	½	
	K = Carrying capacity/ maximum possible numbers in a given habitat	½	5

32	(a) (i) Lymphocytes from the blood of the patient are grown in a culture outside the body, a functional ADA cDNA (using a retroviral vector) is then introduced into these lymphocytes, which are subsequently returned to the patient. (ii) Method of producing thousands of plants through tissue culture is called micro-propagation, Used in Tomato/Banana/Apple/any two example **(any two correct examples)** **OR** (b) • DNA fragments are negatively charged molecules, they can be separated by forcing them to move towards the anode under an electric field through a medium/matrix, the DNA fragments separate (resolve) according to their size through sieving effect, smaller DNA fragment move farther • -The separated DNA fragments can be visualized after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation, The separated bands of DNA are cut out from the agarose gel and extracted from the gel piece. This step is known as elution.	1x3 1+ 1/2+1/2 1x 3 1x2	5
33	(a) (i) Three cells are grouped together at the micropylar end of embryo sac, constitute the egg apparatus, the egg apparatus in turn consists of two synergids , one egg cell, the synergids have special cellular thickenings at the micropylar tip called filiform apparatus, three cells are at the chalazal end and are called the antipodals, the large central cell has two polar nuclei, thus a typical angiosperm embryo sac at maturity though 8-nucleate is 7-celled. //  (**Award marks for correct diagram with 8 labeling)** (ii)One of the two male gametes fuses with the two polar nuclei located in the central cell to produce a triploid primary endosperm nucleus (PEN). **OR** (b)	½x 8 ½x 8 1	

Phases of Menstrual cycle	Pituitary hormones	Ovarian hormone	Ovary	Uterus
1) Menstrual phase/day 1-5	Low FSH and LH	Low Progesterone and Estrogen	Follicle start to develop	Lining of endometrium shed and expelled as menstrual flow
2)Follicular/Proliferative phase/day 6-13	FSH and LH rises	Estrogen rises and low progesterone	Follicle mature	Endometrium to thicken
3) Ovulatory phase/day 14-15	LH surge (about 14th day)	Increase level of estrogen and low progesterone	Graafian follicle ruptures	Uterus lining further thickens
4) Luteal phase/day 16-28	FSH and LH level begins to decline	High progesterone and low Estrogen	Ruptured follicle transformed into the corpus luteum which produce progesterone and estrogen	Uterus lining continues to thicken for implantation

1 + ½x4 + ½x4

(NOTE: If all phases of menstrual cycle are correct then award 1 mark, Award ½ marks if both ovarian and pituitary hormone levels are correct in each phase and ½ marks for changes in both ovary and uterus for each phase)

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	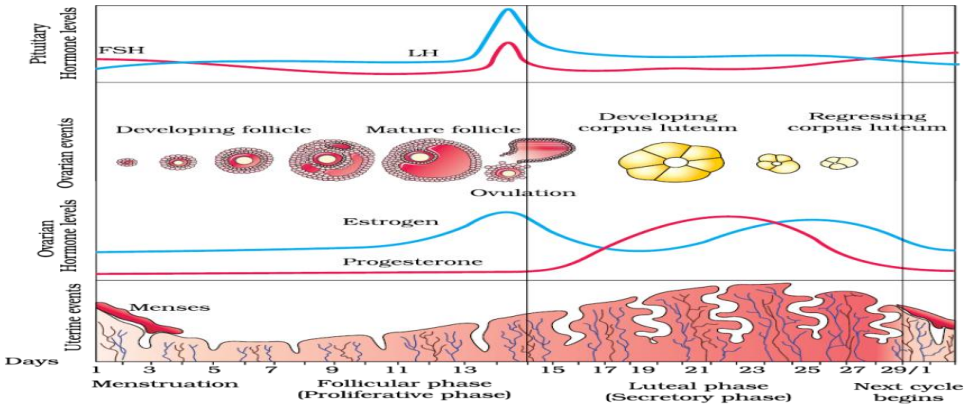 **(NOTE: If all phases of menstrual cycle are correct then award 1 mark, Award ½ marks if both ovarian and pituitary hormone levels are correct in each phase and ½ marks for changes in both ovary and uterus for each phase)**	1 + ½x4 + ½x4	5