SOLUTIONS
Senior Secondary School Examination, 2025
BIOLOGY (Subject Code-044)
[Paper Code: 57/1/2]

Maximum Marks: 70

<table>
<tr><th>Q.No.</th><th>EXPECTED ANSWERS /VALUE POINTS</th><th>Marks</th><th>Total Marks</th></tr>
<tr><td></td><td>SECTION A</td><td></td><td></td></tr>
<tr><td>1</td><td>(A) / Soil A has slower rate of decomposition than soil B.</td><td>1</td><td>1</td></tr>
<tr><td>2.</td><td>(C) I 25 to 50 micrometer</td><td>1</td><td>1</td></tr>
<tr><td>3.</td><td>(C) I Menstrual phase, Follicular phase,Ovulatory phase, Luteal phase,</td><td>1</td><td>1</td></tr>
<tr><td>4.</td><td>(D) /Phenotypes = 4 ; genotypes= 9</td><td>1</td><td>1</td></tr>
<tr><td>5.</td><td>(A)/ Preventing the process of translation of mRNA of the nematode.</td><td>1</td><td>1</td></tr>
<tr><td>6.</td><td>(B) /5'-AAUGCUAGGCAC-3'</td><td>1</td><td>1</td></tr>
<tr><td>7.</td><td>(C)/ 50%</td><td>1</td><td>1</td></tr>
<tr><td>8.</td><td>(B) I Australopithecine-Homo erectus-Neanderthal-Homo sapiens</td><td>1</td><td>1</td></tr>
<tr><td>9.</td><td>(D)/ Genetic Engineering Approval Committee</td><td>1</td><td>1</td></tr>
<tr><td>10.</td><td>(D) I Cell mediated immune response</td><td>1</td><td>1</td></tr>
<tr><td>11.</td><td>(C)/ 1 billion times</td><td>1</td><td>1</td></tr>
<tr><td>12.</td><td>(B) IP-Zygote Q- Suspensor R- Cotyledon S- Plumule</td><td>1</td><td>1</td></tr>
<tr><td>13.</td><td>(A) I Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)</td><td>1</td><td>1</td></tr>
<tr><td>14.</td><td>(C) I Assertion (A) is true, but Reason (R) is false .</td><td>1</td><td>1</td></tr>
<tr><td>15.</td><td>(A) I Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A)</td><td>1</td><td>1</td></tr>
<tr><td>16.</td><td>(B) I Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).</td><td>1</td><td>1</td></tr>
<tr><td></td><td>SECTIONB</td><td></td><td></td></tr>
<tr><td>17.</td><td>1- Down's Syndrome (45+XX/ 45+XY) / Trisomy of autosome
2- Klinefelter's Syndrome (44+XXY)

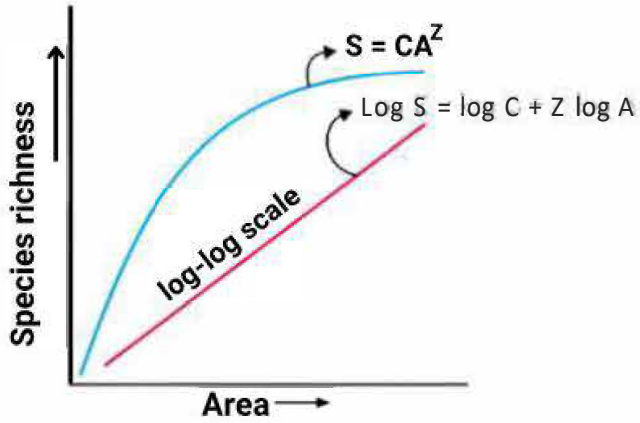
<table>
<tr><th>Down's syndrome/ Trisomy of autosome</th><th>Klinefelter's syndrome</th></tr>
<tr><td>Trisomy 21 st chromosome/ one extra autosomalchromosome</td><td>Presence of an extra sex chromosome / Trisomy of sex chromosome</td></tr>
<tr><td>Sterile male or sterile female</td><td>only sterile male</td></tr>
<tr><td>affected individuals are short statured with small round head/furrowed tongue/physical /psychomotor and mental development is retarded.</td><td>Overall masculine development / the feminine development (development of breast)/ gynaecomastia/ tall statured/(any other relevant symptom)</td></tr>
</table>
(1 mark for any one correct difference)
(Any other abnormality due to trisomy of autosome is mentioned with relevant points marks to be awarded)</td><td>½
½

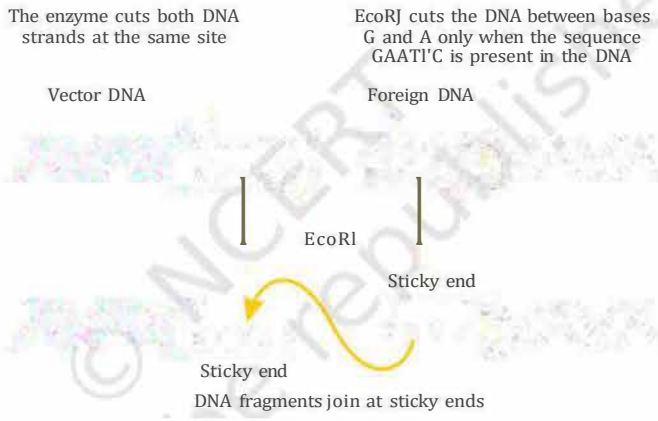
1</td><td>2</td></tr>
</table>

18.	(a) Genotype A= Aa, B= aa, C= Aa, D= aa **(award one mark if any two genotype are correct)** (b) i) Autosomal trait ii) Dominant	½× 2 ½ ½	2
19.	(A) The genetically engineered lymphocytes are not immortal hence the patient requires periodic infusion There could be permanent cure if the gene isolated from bone marrow cells producing ADA is introduced into (lymphocytes) cells at early embryonic stages **OR** (B) Micro-injection, Recombinant DNA is directly injected into the nucleus of an animal/ Biolistics or gene gun, plants cells are bombarded with high velocity micro-particles of gold or tungsten coated with DNA *I* Heat shock , Recombinant DNA can then be forced into such cells by incubating the cells with recombinant DNA on ice which is followed by placing them briefly at 42° C (heat shock) and then putting them back on ice **(Any two techniques).**	1 1 ½+½ ½+½ ½+½	**2**
20.	(A) Heroin are obtained by acetylation of morphine *I* Both are opioids. Effects - Morphine is a very effective sedative/painkiller - Heroin is a depressant/slows down body functions. **OR** **(B)** (i) (1) Whisky/Brandy/ Rum (anyone) (2) Wine/ Beer (anyone) (ii) Cyanobacteria fix atmospheric nitrogen, add organic matter to soil ,and increase soil fertility. **(Any two points)**	1 ½ ½ ½ ½ ½+½	2
21	**(A)** -Natural old forest will be more productive, -As it contains more biomass or high biodiversity which will trap and store solar radiation in form of biomass ,Young forest is still developing and contain fewer tress will not capture solar radiations as much as old forest so productivity is low , Shallow polluted lake contains less number of producers and high amount of dead organic matter so productivity is less in comparison to natural old forest. **OR** (B)	½ X4	

Net Primary Productivity	Gross Primary Productivity
i)Gross primary productivity minus respiration loses (R) is the net primary productivity.	i)Gross primary productivity of an ecosystem is the rate of production of organic matter

2

	ii)It is the available biomass for the to heterotrophs. e espiratio **(Any one point).**	during photosynthesis. ii)A considerable of primary by plants	2
	SECTION-C		
22	(a) • *'ori'* – This is a sequence in cloning vector from where replication starts and is also responsible for controlling the copy number of the linked DNA. • *'rop'* -- codes for the proteins involved in the replication of the plasmids. (b)	1 1	
	Exonucleases: It is an enzyme that cuts DNA from 5' or 3' end or terminal region of nucleic acid / It removes nucleotide from the ends of the DNA Endonucleases: It is an enzyme that cuts DNA from any point inside the strand / It makes cuts at specific position within the DNA. **(1 mark for the correct difference)**	1	3
23.	(a)  Note: If anyone line of graph is correctly drawn then one mark is to be awarded. -Equation log S = log C+Z log A / S=CA^z (b) Z = in range of 0.1 to 0.2 regardless of taxonomic group or the region / Z = 0.6 to 1.2 for the entire continent/ Z = 1.15 frugivorous birds and mammals in the tropical forests.	1 1 1	3
24.	(a) Amniocentesis, In amniocentesis some of the amniotic fluid of the developing embryo is taken to analyse the foetal cells and dissolved substances to test the presence of genetic disorders. (b) -Medical Termination of Pregnancy/MTP	½+½ ½x3	

	-Yes -as MTP is comparatively safe upto 12 weeks (the first trimester) of pregnancy. (c) When it is performed by unqualified quacks / if foetus is found to be a normal female followed by MTP for female foeticide	½	**3**
25.	(a) 3' - CTTAAG- 5' (b) EcoRI (c) ♦ Restriction enzyme cuts the strand of DNA between the same two bases on the opposite strands. This leaves single stranded portion or overhanging stretches at the two ends known as sticky ends. *I*  ♦ **Role of sticky ends** : Sticky ends forms hydrogen bond with their complementary cut counter part/ /they help in joining of vector DNA and foreign DNA during rDNA technology/ stickiness of ends facilitates the action of the enzyme DNA ligase	½ ½ 1 1	**3**
26.	(a) Sporozoites (b) In the gut of the female *Anopheles* mosquito (c) P: Salivary glands Q: Gametocytes (d) Asexual phase = In human Sexual phase = In mosquito	½ ½ ½ ½ ½ + ½	3
27	Differences Divergent evolution / Convergent evolution Divergent evolution occurs when same structures developed along different directions due to adaptations to different needs / Convergent evolution occurs when different structures evolving for the same function and hence having similarities Divergent evolution produces homologous structures. / Convergent evolution can result in analogous structures	1 + 1	

	It indicates common ancestory	It indicates similar habitat has resulted in selection of similar adaptive features	
	(Any two correct differences)		
	Similarities : -both are influenced by the environment/ -both contribute to species evolution or any other valid point . (Kindly note- compare and contrast include both similarities and differences)	1	3
28.	(a) Nucleosome	½	
	(b) P = DNA Q = Histone octamer	½+½	
	(c) Basic/ Positively charged	½	
	(d)		
	Euchromatin / Heterochromatin **1.** Loosely packed chromatin / 1. Densely packed 2. Lightly stained / **2.** Darkly stained 3. Transcriptionally active chromatin / 3. Transcriptionally inactive chromatin	1	
	(1 mark for any one correct difference)		**3**
	SECTIOND		
29.	(a) The butterfly acquires this chemical during its caterpillar stage by feeding on a poisonous weed.	1	
	(b) Nt+1 = Nt + [(B + I) - (D + E)], 800 = Nt + [(200 + 200) - (150 + 100)] 800 = Nt + (400-250) 800 = Nt + 150 Nt = 800 - 150 = 650	½ + ½	
	Comment As the population density is increasing with time so age pyramid would be of expanding population.	1	
	(c) Single huge banyan tree - measured in terms of biomass or percent cover, carrot grass- measured in terms of percent cover	½ + ½	
	OR		
	(d) pug marks, faecal pellets.	½ + ½	4
30.	a) Luteinsing hormone /LH , helps in ovulation / induce rupturing of graafian follicles	½ + ½	
	b) Ovary : Maturation of follicles.	1+1	

	Uterus : Proliferation of endometrium lining. c) Q - Progesterone , Maintains pregnancy / maintenance of endometrium **OR** d) Corpus luteum, Graafian follicle transforms into corpus luteum after ovulation	½ + ½ ½ + ½	4
	SECTIONE		
31.	A) (a)		

Vegetative cell	Generative cell
It is big with abundant food reserve and an irregular shaped nucleus	Generative cell is small, floats in the cytoplasm of the vegetative cell
Helps in the formation of pollen tube	Forms two male gamete

½

1

(1/2 mark for correct names and 1 mark for the correct difference)

(b)(i)

1 = Autogamy ½

2 = Geitonogamy ½

3 =Xenogamy ½

(ii)

a = by Insects or wind ½

b = by Water ½

(iii)

Genetic variation, Healthier offspring,Elimination of recessive traits, Disease resistance ,Evolution, no inbreeding depression, promotes depression. ½ + ½

(Any two advantages)

OR

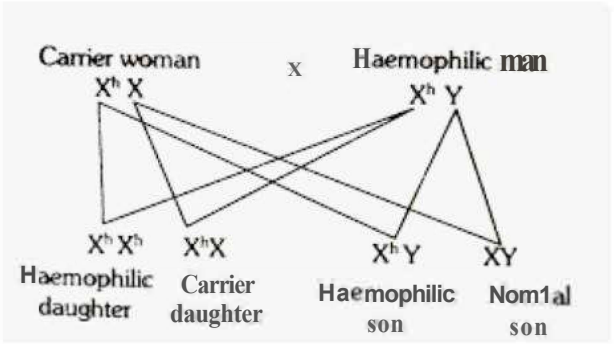
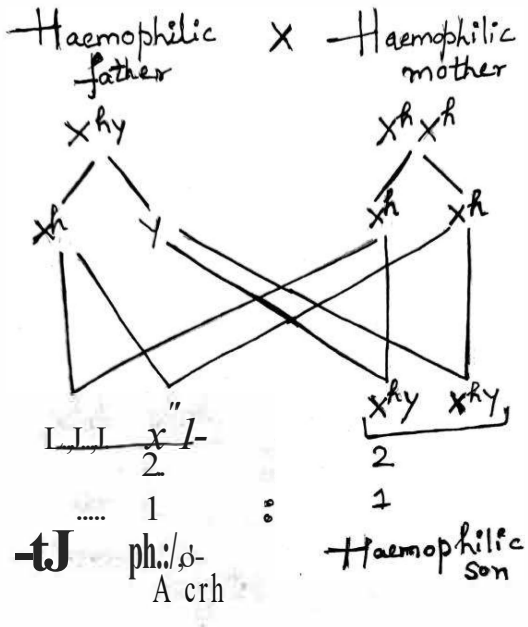
(B)

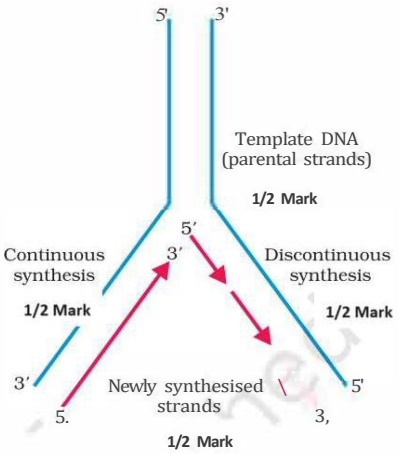
(i) P is able to penetrate or fertilise the ovum ,whereas Q and R are unable to penetrate or fertilise. ½ + ½

(ii) When a sperm comes in contact with the zona pellucida layer of the ovum it induces changes in the membrane that blocks the entry of additional sperms. 1

(iii) Entry of sperm induces completion of meiotic division of the secondary oocyte and formation of second polar body and a haploid ovum (ootid) 1

	(iv) **-Acrosome** : It is filled with the enzyme which helps the sperm to enter into the cytoplasm of the ovum **-Middle piece:** It has numerous mitochondria which produce energy for the movement of tail that facilitate sperm motility for fertilisation	1 1	5
32.	(A) (i) -MALT is Mucosa Associated Lymphoid Tissue -It is located within the lining of the major tracts like Respiratory or digestive or urogenital tract. (ii) Cytokine barriers - virus infected cells secrete proteins called interferons which protect non-infected cells from further viral infection. (iii) Enzyme Linked Immunosorbent Assay or ELISA ,ELISA is based on the principle of antigen-antibody interaction / PCR or Polymerase Chain Reaction , amplification of nucleic acid (iv) Both Bone marrow and thymus provide micro- environment for the development and maturation of T-lymphocytes / immature lymphocyte differentiate into antigen sensitive lymphocytes *I* Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced and some lymphocytes migrate to thymus for development and maturation. **OR** (B) (i) a) H = *Clostridium butylicum* I = Bacteria b) J = Statin K = Fungi *I* Yeast c) L = *Trichoderma polysporum* M = Immunosuppressant /Suppress immune system in patients with newly transplanted organs (ii)Baculovirus are species specific, narrow spectrum insecticidal properties, No negative impact on non target species like plants or mammals or birds or fishes or Any other valid point. **(Any two point)**	½ ½ 1 1 + 1 1 ½ ½ ½ ½ ½ ½ 1 + 1	**5**

33.	(A) (i) Both are sex-linked/ X-linked recessive disorder Males usually have only single X chromosome so disease is easily expressed. (ii) Cross-1  Ratio 1:1 Haemophilic daughter:Haemophilic son **(1 mark for the correct genotype of the parents and 1 mark for the correct cross)** Cross-2  **(1 mark for the correct genotype of the parents and 1 mark for the correct cross)** **OR** (B) (i) Transcription in bacteria occurs in cytoplasm of cell , Translation in bacteria occurs in cytoplasm of cell In Eukaryotes transcription occurs in nucleus ,and translation occurs in the cytoplasm.	½ ½ 1 1 1 1 ½ ½ ½+½	

	(ii)  Note: Award½ mark each for the correct polarity of template DNA and newly synthesised DNA strands. (iii) Total nucleotides = 1000 Adenine= 240 A= T therefore T= 240 A+T= 480 C+G= 1000-(A+T)= 1000-480= 520 Since C= G Therefore C= 520/2 = 260 Total Pyrimidines= T+C Therefore 240+260= 500 **(1 mark for the correct answer)**	½×4 1	5