Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior Secondary School Certificate Examination, 2025
SUBJECT NAME BIOLOGY (Q.P. CODE 57/7/2)

General Instructions: -

1	You are aware that evaluation is the most important process in the actual and correct assessment of the candidates. A small mistake in evaluation may lead to serious problems which may affect the future of the candidates, education system and teaching profession. To avoid mistakes, it is requested that before starting evaluation, you must read and understand the spot evaluation guidelines carefully.
2	"Evaluation policy is a confidential policy as it is related to the confidentiality of the examinations conducted, Evaluation done and several other aspects. Its' leakage to public in any manner could lead to derailment of the examination system and affect the life and future of millions of candidates. Sharing this policy/document to anyone, publishing in any magazine and printing in Newspaper/Website, etc. may invite action under various rules of the Board and IPC."
3	Evaluation is to be done as per instructions provided in the Marking Scheme. It should not be done according to one's own interpretation or any other consideration. Marking Scheme should be strictly adhered to and religiously followed. However, while evaluating, answers which are based on latest information or knowledge and/or are innovative, they may be assessed for their correctness otherwise and due marks be awarded to them. In class-XII, while evaluating two competency-based questions, please try to understand given answer and even if reply is not from marking scheme but correct competency is enumerated by the candidate, due marks should be awarded.
4	The Marking scheme carries only suggested value points for the answers These are in the nature of Guidelines only and do not constitute the complete answer. The students can have their own expression and if the expression is correct, the due marks should be awarded accordingly.
5	The Head-Examiner must go through the first five answer books evaluated by each evaluator on the first day, to ensure that evaluation has been carried out as per the instructions given in the Marking Scheme. If there is any variation, the same should be zero after delibration and discussion. The remaining answer books meant for evaluation shall be given only after ensuring that there is no significant variation in the marking of individual evaluators.
6	Evaluators will mark(√) wherever answer is correct. For wrong answer CROSS 'X' be marked. Evaluators will not put right (✓)while evaluating which gives an impression that answer is correct and no marks are awarded. This is most common mistake which evaluators are committing.
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
9	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a note "Extra Question".

10	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
11	A full scale of marks 0 to 70 marks has to be used. Please do not hesitate to award full marks if the answer deserves it.
12	Every examiner has to necessarily do evaluation work for full working hours i.e., 8 hours every day and evaluate 20 answer books per day in main subjects and 25 answer books per day in other subjects (Details are given in Spot Guidelines). This is in view of the reduced syllabus and number of questions in question paper.
13	Ensure that you do not make the following common types of errors committed by the Examiner in the past:- ● Leaving answer or part thereof unassessed in an answer book. ● Giving more marks for an answer than assigned to it. ● Wrong totaling of marks awarded on an answer. ● Wrong transfer of marks from the inside pages of the answer book to the title page. ● Wrong question wise totaling on the title page. ● Wrong totaling of marks of the two columns on the title page. ● Wrong grand total. ● Marks in words and figures not tallying/not same. ● Wrong transfer of marks from the answer book to online award list. ● Answers marked as correct, but marks not awarded. (Ensure that the right tick mark is correctly and clearly indicated. It should merely be a line. Same is with the X for incorrect answer.) ● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.
14	While evaluating the answer books if the answer is found to be totally incorrect, it should be marked as cross (X) and awarded zero (0)Marks.
15	Any unassessed portion, non-carrying over of marks to the title page, or totaling error detected by the candidate shall damage the prestige of all the personnel engaged in the evaluation work as also of the Board. Hence, in order to uphold the prestige of all concerned, it is again reiterated that the instructions be followed meticulously and judiciously.
16	The Examiners should acquaint themselves with the guidelines given in the "Guidelines for Spot Evaluation" before starting the actual evaluation.
17	Every Examiner shall also ensure that all the answers are evaluated, marks carried over to the title page, correctly totaled and written in figures and words.
18	The candidates are entitled to obtain photocopy of the Answer Book on request on payment of the prescribed processing fee. All Examiners/Additional Head Examiners/Head Examiners are once again reminded that they must ensure that evaluation is carried out strictly as per value points for each answer as given in the Marking Scheme.

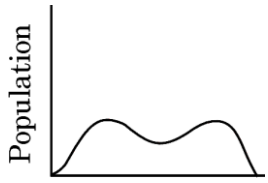
MARKING SCHEME

Senior Secondary School Examination, 2025

BIOLOGY (Subject Code–044)

[Paper Code: 57/7/2]

Maximum Marks: 70

S.No.	EXPECTED ANSWERS/VALUE POINTS	MARKS	TOTAL MARKS
	SECTION A		
1.	(B) / Modified bacterial plasmid	1	1
2.	(C) / 	1	1
3.	(B) / Macrophages – Mucus-secreting cells that trap microbes entering into the body.	1	1
4.	(B) / Unequal cells- a larger haploid secondary oocyte and a smaller haploid polar body.	1	1
5.	(A) / All tall.	1	1
6.	(B) / ELISA – Antigen antibody interaction.	1	1
7.	(D) / Morphine is often given to persons who have undergone surgery as a painkiller.	1	1
8.	(A) / 8·1%	1	1
9.	(C) / Bacillus thuringiensis	1	1
10.	(A) / P – Top Carnivore , Q – Detritus , R – Secondary Consumer	1	1
11.	(C) / Short non-coding repetitive sequences forming a large portion of eukaryotic genome.	1	1
12.	(A) / Multicarpellary, Apocarpous	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.	(C) / Assertion (A) is true, but Reason (R) is false.	1	1
15.	(C) / Assertion (A) is true, but Reason (R) is false.	1	1
16.	(A) / Both Assertion (A) and Reason (R) are true and Reason (A) is correct explanation of Assertion (A)	1	1

	SECTION B		
17.	(a) Cry gene from *Bacillus thuringiensis* has been introduced into cotton plants. The gene produces inactive toxin protein (protoxin), when the insect ingests this protein it gets converted to an active toxin due to alkaline pH of the insect gut, and binds to the surface of midgut epithelial cells of insects and create pores that causes cell swelling and lysis and death of insect. **OR** (b) Molecular diagnostic techniques : - PCR (Polymerase chain reaction) – This technique can detect presence of bacterial or viral pathogen in very low concentration i.e. helps in early detection of a disease. -Mutations of genes in suspected cancer patients can be detected by hybridising a probe with the complementary DNA in the cells of patient followed by detection using autoradiography. -Enzyme-linked immunosorbent assay (ELISA) is based on principle of antigen antibody interaction /detect antibodies synthesized by the body against the specific antigen / detect presence of antigen in the patient **(Any two techniques**)	½ ½x3 1+1	2
18.	(a) • The human body produces antibodies against the vaccine which would neutralise the pathogenic agents during actual infection**,** Vaccines also generate memory B and T cells. • Vaccination will prevent occurrence of diseases by quickly recognising the pathogen and producing antibodies hence making society disease free. **OR** (b) Mucus coating of the gastrointestinal tract/ Acid in the stomach /saliva in mouth (**Any two barriers)**	½+½ 1 1+1	2
19.	(a) Signals for parturition arise from fully developed foetus and placenta which induce mild uterine contractions**,** called foetal ejection reflex**,** this triggers release of oxytocin from maternal pituitary**,** which act on uterine muscle and causes stronger uterine contractions. **OR** (b) (i) Menstrual cycle ceases / menopause occur around 50 years of age. (ii) During oogenesis Meiosis I and II are unequal divisions which form one large cell and a smaller polar body / The unequal cell formation will ensure that the large cell has more cytoplasm and more nutrient reserve for better survival of the zygote. Meiosis I and II are equal divisions in spermatogenesis.	½x4 1 ½ ½	2

<table>
<tr><td>20.</td><td>(a) Dryopithecus / Ramapithecus (Any one primate)
(b) Tanzania/ Ethiopia (Any one place)
(c) Australopithecines
(d) Homo erectus</td><td>½x4</td><td>2</td></tr>
<tr><td>21.</td><td>(a) Drosophila melanogaster
(b)
-Could be grown on simple synthetic medium in laboratory.
-Complete life cycle in 2 weeks / short life span
-Single mating produce large number of flies.
-Clear difference between male and female /shows sexual dimorphism
-Many types of hereditary variations seen under low power of microscopes.
(Any two reasons)</td><td>1

½x2</td><td>2</td></tr>
<tr><td></td><td>SECTION C</td><td></td><td></td></tr>
<tr><td>22.</td><td>In an aquatic ecosystem-Grazing food chain (GFC).
In a terrestrial ecosystem-Detritus food chain (DFC).

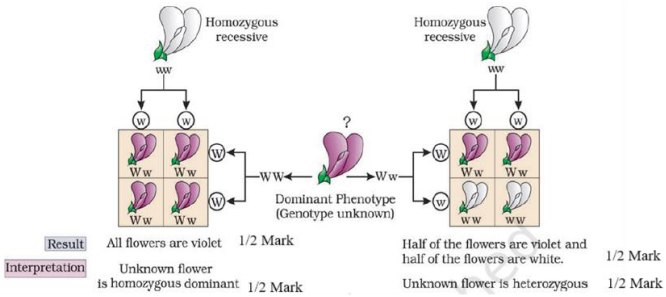
Differences –
<table>
<tr><td>Grazing Food Chain</td><td>Detritus food chain</td></tr>
<tr><td>Transfer of energy starts from producers in a food chain.</td><td>Transfer of energy starts from detritus /decomposing organic matter.</td></tr>
<tr><td>More energy flows through this.</td><td>Less amount of energy flows through this .</td></tr>
<tr><td>Energy obtained from Sun</td><td>Energy obtained from dead organic matter</td></tr>
<tr><td>Major conduit of energy in aquatic system</td><td>Major conduit of energy in terrestrial system</td></tr>
</table>
(Any two differences)</td><td>½
½

1x2</td><td>3</td></tr>
<tr><td>23.</td><td>• Process involved is RNA interference (RNAi)
• Using Agrobacterium vectors nematode-specific genes were introduced into the host plant, the introduction of DNA was such that it produced both sense and anti-sense RNA in the host cells, these two RNAs being complementary to each other formed a double stranded (dsRNA) that initiated RNAi and thus, silenced the specific mRNA of the nematode leading to its death in transgenic host.</td><td>1

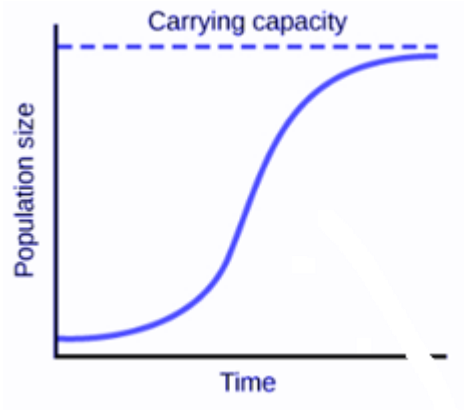
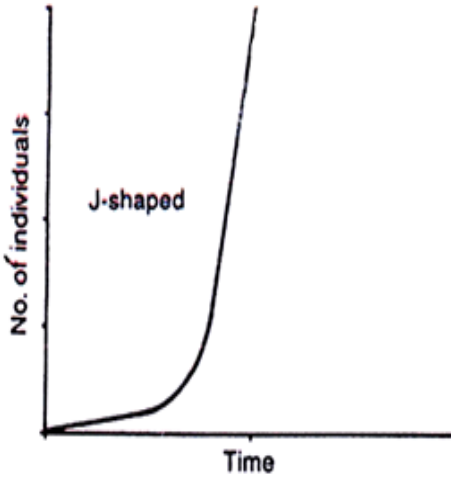
½x4</td><td>3</td></tr>
<tr><td>24.</td><td>(a) ‘A T C G T A C T A’
(b) Base pairs are held by weak hydrogen bonds/ A pairs with T with two H-bonds and G pairs with C forming three H-bonds</td><td>1
1</td><td></td></tr>
</table>

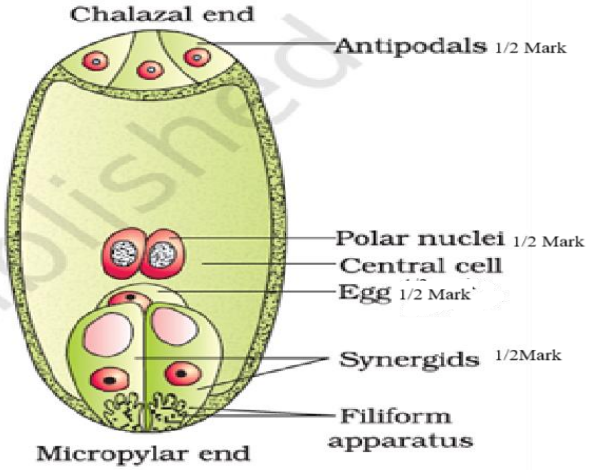
	(c) • In a double-stranded DNA the ratios between Adenine and Thymine and Guanine and Cytosine are constant and equal to one . • Erwin Chargaff	½ ½	3
25.	(a) Oral Pills Merits – Effective with less side effects/reversible/ cost effective/ user friendly. Demerits – Have side effects when taken for a long time/ Pills if not taken and not repeated in a particular pattern may fail to prevent conception/wrong usage may promote conception Surgical Method : Merits – Highly effective / Block gamete transport Demerits – Not reversible / Can affect health if not performed in hygienic conditions. (b)IUD's prevent conception by -Increase phagocytosis of sperms. -Some suppress sperm motility and fertilizing capacity of sperms by releasing Cu^{++} ions. - Hormone releasing IUD's make uterus unsuitable for implantation and cervix hostile to sperms. (**Any two points**)	½ ½ ½ ½ ½+½	3
26.	(a)Large number of plants can be grown in short period of time, useful where sexual reproduction is not possible, plants without seeds can be multiplied, every plant has same genetic makeup. **(Any two advantages)** (b)Any part of the plant or explant is grown in a test tube under sterile conditions, in nutrients medium (containing sucrose, vitamins, inorganic salts,amino acids, growth regulators like auxin and cytokinin etc) (c)Banana, Apple, Tomato. **(Any two food plants)**	½+½ ½+½ ½+½	3
27.	(a)This is adaptive radiation leading to divergent evolution. Example – Many varieties of Darwin's finches on the same island arose from the original seed-eating finches with altered beaks enabling them to become insectivorous and vegetarian finches / A number of marsupials different from each other evolved from an ancestral stock but all within the Australian island /or any other relevant example. (b) • Example-Evolution of Placental mammals and Australian Marsupials or any other corresponding example of these categories respectively. • Convergent evolution.	½ 1 1 ½	3

28.	Typhoid – Sustained high fever 39-40°C/ stomach-pain/ constipation. Pneumonia- severe problems in respiration/in severe cases the lips and fingernails may turn grey to bluish in colour/ chills /cough Malaria- If chills and high fever occurs in every 3 – 4 days.	1 1 1	3
	SECTION D		
29.	(a) A – Geitonogamy B – Autogamy (b) -Anthers and stigma to be close to each other in a bisexual flower cleistogamous flower / closed flower / Pollen release and stigma receptivity at the same time **(Any two conditions)** (c)(i)Advantage → Assured seed set /no dependence on pollinators / pure breed can be obtained. Disadvantage → No genetic variation / Inbreeding depression **OR** (c) (ii) • *Oxalis/ Viola* or common pansy/ *Commelina* . • Some flowers do not open at all /cleistogamy/ closed flower hence show autogamy.	½ ½ 1+1 ½ ½ ½ ½	4
30.	(a) • Sewage treatment plant • used to treat sewage water before it can be released into water body. (b)Air helps in growth of flocs (aerobic bacteria along with fungal filaments), which decompose organic matter in the sewage using oxygen. (c)(i) Bacterial 'flocs' settle down to form activated sludge. **OR** (c) (ii)BOD is directly related to the measure of the organic matter present in water/ Greater the BOD more is the polluting potential	½ ½ 1+1 1 1	4

	SECTION E		
31.	(a) (i) • It is a cross to determine unknown genotype of an organism showing dominant phenotype by crossing with a recessive parent. • A cross between plant with dominant phenotype (example violet colour flower) and plant with recessive phenotype(white colour flower)(monohybrid cross) is done - If the F1 individuals show 1 : 1 ratio between dominant and recessive phenotype(violet flower : white flower) ,then the given plant is heterozygous (Vv) If the F1 individual show all dominant phenotype (all violet flower) ,then plant is homozygous (VV) /	½ ½+½ ½+½	
	 	½+½ ½+½	
	Cross can be explained by taking any other dominant phenotype (ii) • Haemohilia is a sex linked recessive trait and human females are rarely haemophilic because mother of such a female has to be at least carrier and father should be haemophilic. •	½	
	Mother Father P1 generation - XX^h x X^hY F1 generation - XX^h , XY , X^hX^h , X^hY Carrier female, normal male, haemophilic female, haemophilic male /	½ ½	
	Mother Father P1 generation - XX^h x XY F1 generation - XX , XY , X^hX , X^hY Normal female, normal male, carrier female,haemophilic male	½ ½	
	• A haemophilic female can be born if both the X chromosomes are having haemophilic gene / X^hX^h	½	
	• clotting of blood is affected /In an affected individual a simple cut results in nonstop bleeding.	½	

	OR (b) a – Transcription c – Translation (i) – 'a' in Nucleus of cell 'c' in Cytoplasm of cell (ii) • Changes in Event 'b' Splicing ,–Removal of introns (non coding portions) and joining of exons (coding parts) from primary transcript. Capping –An unusual nucleotide methyl guanosine triphosphate is added at 5' end of primary transcript. Tailing –200 – 300 Adenylate residues are added at 3' end of primary transcript • These changes are needed to change the primary transcript (hnRNA) into a functional mRNA ready to make proteins.	½ ½ ½ ½ ½+ ½ ½ ½ 1	5
32.	(a) (i)Alien species invasion – when alien species are introduced unintentionally or deliberately some of them turn invasive and cause decline or extinction of indigenous species. I.Nile Perch – In Lake Victoria in East Africa Nile Perch caused extinction of 200 species of cichlid fish. II. *Lantana* and *Eichhornia* – Caused environmental damage and threat to native species. III.*Clarias gariepinus* – African catfish introduced for aquaculture purposes poses a threat to indigenous catfishes in our rivers. (ii) Regions with high levels of species richness, high degree of endemism have been declared as biodiversity hotspots to conserve biodiversity. In India – Indo-Burma , Himalaya ,Western Ghats and Sri Lanka **(Any two regions)** **OR** (b) (i) $dN/dt = rN\left[\frac{K - N}{K}\right]$	1 1 ½ ½ ½+½ ½+½ 1	

	(ii)  Sigmoid growth curve (iii)  J-shaped growth curve (iv) -Logistic Growth curve / Sigmoid growth curve is more realistic -A given habitat in nature has enough resources to support a maximum possible number beyond which further growth is not possible/ resources become limiting factor	1 1 1+1	5
33.	(a) (i) A – Spermatozoa B – Spermatid /Spermatozoa C – Sertoli cells D – Spermatogonium (ii) Secondary spermatocyte – 23 chromosomes Spermatid – 23 chromosomes	½x4 ½+½	

	(iii) Spermiogenesis – Process by which spermatids are transformed into spermatozoa. Spermiation – Process by which sperm had their head embedded in Sertoli cells are released from seminiferous tubules. **OR** (b) (i) P-Megaspore mother cell Q-Megaspores (four megaspores) (ii) (I)Meiosis. (II) • Only one cell • Monosporic development (III) Three free nuclear division (IV) The mature female gametophyte has 3 cells at micropylar end – Egg apparatus (two synergids and one egg cell) with thickenings called filiform apparatus in synergids, three cells at chalazal end – Antipodals, large central cell with two polar nuclei, so it is 8-nucleated and 7-celled. /  	1 1 ½ ½ ½ ½ ½ ½ ½x4	5