

Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior School Certificate Examination, 2024
SUBJECT NAME BIOLOGY [Q. Paper Code: 57(B)]

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 News Paper/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 deliberation 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.

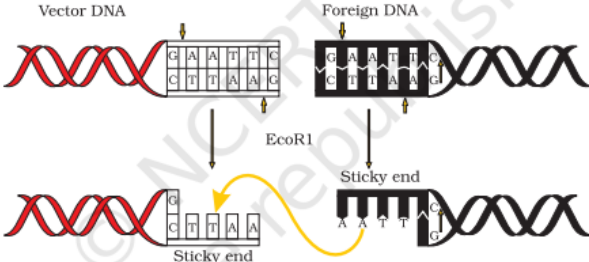
7	If a question has parts, please award marks on the right-hand side for each part. Marks awarded for different parts of the question should then be totaled up and written in the left-hand margin and encircled. This may be followed strictly.
8	If a question does not have any parts, marks must be awarded 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 _____(example 0 to 70 marks as given in Question Paper) 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	<p>Ensure that you do not make the following common types of errors committed by the Examiner in the past:-</p> <ul style="list-style-type: none"> ● 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, 2024
BIOLOGY (Subject Code-044)
[Paper Code: 57(B)]

1	(A) / Cytoplasm, vegetative cell, generative cell	1	1
2.	(B) / Cotyledon	1	1
3.	(A) / Very low recombination	1	1
4.	(C) / haplodiploidy	1	1
5.	(A)/(B)/(C)/(D)/ Progymnosperms/ Tracheophytes/ Bryophytes/ Conifers	1	1
6.	(B) / the role played by selection of resistant varieties	1	1
7.	(D) / uninfluenced by environment	1	1
8.	(D) / Heterozygous dominant × Homozygous recessive	1	1
9.	(A) / Flavivirus	1	1
10.	(D) / p gene	1	1
11.	(D) / mice	1	1
12.	(C) / Amensalism	1	1
13.	(C) / Assertion (A) is true, but Reason (R) is false	1	1
14.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of Assertion (A).	1	1
15.	(D) / Assertion (A) is false, but Reason (R) is true.	1	1
16.	(C) / Assertion (A) is true, but Reason (R) is false.	1	1
SECTION - B			
17.	Rete testis- vasa efferentia – epididymis – vas deferens	½ x 4	2
18	Codes for Methionine, acts as an initiator codon or start codon (during translation)	1+1	2
19.	If full course is not taken only some bacteria are wiped out, surviving bacteria becomes more resistant and spreads the disease further	1+1	2
20.	Ability to divide and renew themselves, which give rise to specialized cells/ undergoes differentiation	1+1	2
21.	(a) (i) Producer (Tree) – Primary consumer (insects) – secondary consumer (the small birds) – Tertiary consumer (large birds)	½ x 2	2
	(ii) Pyramid of Biomass- Upright, Pyramid of numbers – Inverted OR	½ x 2	
	(b) (i) Chitin/ lignin/ complex substances → slow, N-rich/ water soluble substances like sugar enriched → high	½ x 2	
	(ii) Warm and moist environment → faster, lower temperature – slower	½ x 2	

SECTION - C												
22.	<p>(a)</p> <ul style="list-style-type: none"> In the ovary After ovulation (from ruptured graafian follicle) Luteinizing hormone (LH), secreted by (anterior) pituitary influences the development of graafian follicles <p>(b) (i) It releases progesterone which is responsible for secretory phase of the uterine endometrium (ii) Maintenance of endometrial wall / support pregnancy/ Continues to release progesterone in the initial phase of pregnancy</p>	<p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	3									
23.	<ul style="list-style-type: none"> Fertilization takes place in Ampullary region or Ampullary isthmic junction of fallopian tube The secretions of the acrosome help the sperm enter into the cytoplasm of the ovum through the zona pellucida and the plasma membrane, this induces the completion of the meiotic division of the secondary oocyte, the second meiotic division is also unequal and results in the formation of a second polar body and a haploid ovum (ootid), the haploid nucleus of the sperms and that of the ovum fuse together to form a diploid zygote 	<p>1</p> <p>$\frac{1}{2} \times 4$</p>	3									
24.	<p>Colorblindness is a Sex-linked recessive disorder</p> <p>The mother ($X^c X$) is carrier of defective/recessive gene, and the father ($X Y$) with normal vision has normal gene, the colorblind son ($X^c Y$) receives defective gene from carrier mother, and daughter ($X X$) with normal vision receives normal gene from both the parents</p> <p style="text-align: center;">//</p> <p>Colorblindness is a Sex-linked recessive disorder</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Parents $X^c X$ $\frac{1}{2}$ mark X XY $\frac{1}{2}$ mark</p> <p>Gametes X^c X X Y</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>$\text{♀} / \text{♂}$</th> <th>X^c</th> <th>X</th> </tr> </thead> <tbody> <tr> <td>X</td> <td>$X^c X$ Carrier daughter</td> <td>XX $\frac{1}{2}$ mark Normal daughter</td> </tr> <tr> <td>Y</td> <td>$X^c Y$ Colour blind son $\frac{1}{2}$ mark</td> <td>XY Normal son</td> </tr> </tbody> </table> </div>	$\text{♀} / \text{♂}$	X^c	X	X	$X^c X$ Carrier daughter	XX $\frac{1}{2}$ mark Normal daughter	Y	$X^c Y$ Colour blind son $\frac{1}{2}$ mark	XY Normal son	<p>1</p> <p>$\frac{1}{2} \times 4$</p> <p>1</p> <p>$\frac{1}{2} \times 4$</p>	3
$\text{♀} / \text{♂}$	X^c	X										
X	$X^c X$ Carrier daughter	XX $\frac{1}{2}$ mark Normal daughter										
Y	$X^c Y$ Colour blind son $\frac{1}{2}$ mark	XY Normal son										

25.	<ul style="list-style-type: none"> Fossils – impressions or remains of dead animal or plant of prehistoric time in sedimentary rocks Fossils help in establishing ancestral or connecting link between the organisms, Fossils indicates geological period in which they existed, they indicate life forms varied over time (any two) 	1 1+1	3
26.	<p>Lipases – used in detergent formulations in removing oily stains</p> <p>Pectinases and Proteases- to clear bottled juices</p> <p>Streptokinase – clot buster in blood vessels</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3
27.	<p>(a) Isolation of genes cryIAc or cryIIAb from <i>Bacillus thuringensis</i>, Insertion of the gene in cotton plant either through gene gun or through <i>Agrobacterium vector</i>, selection of bollworm resistant cotton crop plant OR</p> <p>(b) Silencing of mRNA by dsRNA will prevent translation, the consequence would be that the parasite could not survive in a transgenic host expressing specific interfering RNA, the transgenic plant therefore got itself protected from the parasite</p>	1 x 3 1 x 3	3
28.	<p>- Genetic diversity/A single species might show high diversity at the genetic level over its distributional range, e.g. The genetic variation shown by the medicinal plant <i>Rauwolfia vomitoria</i> growing in different Himalayan ranges might be in terms of the potency and concentration of the active chemical (reserpine) that the plant produces/ India has more than 50,000 genetically different strains of rice/ India has 1,000 varieties of mango (any one example only)</p> <p>- Species diversity/ The diversity at the species level, e.g. the Western Ghats have a greater amphibian species diversity than the Eastern Ghats</p> <p>- Ecological diversity/At the ecosystem level, e.g. In India for instance greater ecosystem diversity than a Scandinavian country like Norway</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3
SECTION - D			
29.	<p>(a) 5' GAATC 3' 3' CTTAAG 5',</p> <p>Enzyme makes a cut between G and A nucleotide /</p>	$\frac{1}{2}$ $\frac{1}{2}$	

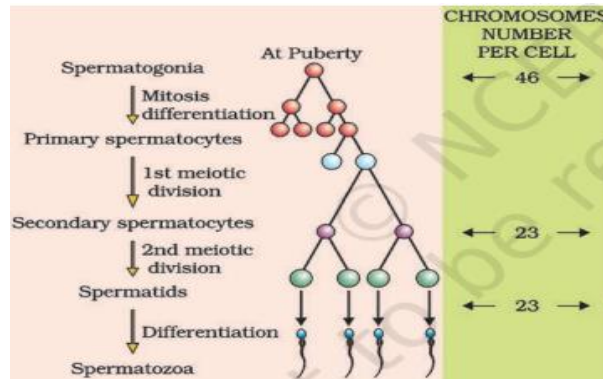
	 <p>(b) The non-transformants will lose resistance to specific antibiotics, and will not form colony, but transformants will show resistance to specific antibiotics, and will form colony</p> <p style="text-align: center;">OR</p> <p>(b) Restriction enzymes, polymerase enzymes, ligases, vectors, host organism (any four correct tools)</p> <p>(c)</p> <ul style="list-style-type: none"> • pBR322/ any other correct example, • To provide flexibility in the choice of restriction endonucleases/ to facilitate insertion of foreign DNA into the vector at restriction site 	<p>$\frac{1}{2} \times 4$</p> <p>$\frac{1}{2} \times 4$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p>	<p>4</p>
30.	<p>(a)</p> <ul style="list-style-type: none"> • Brood parasitism, • Cuckoo – parasite, crow – host <p style="text-align: center;">OR</p> <p>(a) Special suckers to cling on the host, absence of digestive system, loss of special sense organs, high reproductive capacity, or any other correct feature</p> <p>(b) Commensalism is the interaction in which one species benefits and other is neither benefitted nor harmed Example of commensalism – sea anemone and clownfish – the fish gets protection and sea anemone is neutral/ any other correct example</p> <p>(c) Wasp and fig tree/ orchid – <i>Ophrys</i> and a specific bee/ any other correct example</p>	<p>1</p> <p>$\frac{1}{2} \times 2$</p> <p>$\frac{1}{2} \times 4$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>1</p>	<p>4</p>
SECTION - E			
31.	<p>(a) (i) One of the male gametes released by pollen tube fuses with egg/syngamy, to produce zygote, the other male gamete fuses with two polar nuclei located in central cell/triple fusion, to produces Primary Endosperm Nucleus (PEN) , triple fusion leads to the formation of PEC and later endosperm, zygote develops to form embryo</p>	<p>$\frac{1}{2} \times 6$</p>	

(ii) The coconut water from tender coconut is produced, when the PEN undergoes successive nuclear divisions to give rise to free nuclei (Nuclear endosperm), Subsequently cell wall formation occurs (cellular endosperm), leading to the formation of white kernel in coconut

$\frac{1}{2} \times 4$

OR

(b)(i)



$\frac{1}{2} \times 6$

(Any six correct labeling)

/

(i) In testis, the immature male germ cells (spermatogonia) produce sperms by spermatogenesis that begins at puberty, the spermatogonia present on the inside wall of seminiferous tubules multiply by mitotic division to increase in numbers containing 46 chromosomes (diploid) in each cell, some of the spermatogonia called primary spermatocytes periodically undergo meiosis and a primary spermatocyte completes the first meiotic division (reduction division) leading to formation of two equal haploid cells called secondary spermatocytes with 23 chromosomes each, the secondary spermatocytes undergo the second meiotic division to produce four equal haploid spermatids, The spermatids are transformed into spermatozoa (sperms) by the process called spermiogenesis.

$\frac{1}{2} \times 6$

(ii) Luteinizing hormone or LH, acts at the Leydig cells and stimulates synthesis and secretion of androgens which in turn stimulate the process of spermatogenesis.

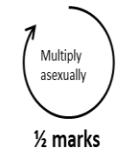
$\frac{1}{2} + \frac{1}{2}$

Follicle Stimulating hormone or FSH, acts on the Sertoli cells and stimulates secretion of some factors which help in the process of spermiogenesis

$\frac{1}{2} + \frac{1}{2}$

5

32.	<p>(a)</p> <p>(i) Alteration of DNA sequences</p> <p>(ii) A change in single nucleotide base pair is termed as point mutation, e.g. Sickle cell anemia.</p> <p>The substitution of glutamic acid by valine in the globin protein, results due to the single base substitution at the sixth codon of the beta globin gene from GAG to GUG,</p> <p>symptoms: breathlessness, tiredness, reduced oxygen carrying capacity</p> <p style="text-align: right;">(any two)</p> <p>(iii) frame-shift mutation</p> <p style="text-align: center;">OR</p> <p>(b) <i>E. coli</i> was grown in a medium containing $^{15}\text{NH}_4\text{Cl}$ (^{15}N is the heavy isotope of nitrogen) as the only nitrogen source for many generations, the result was that ^{15}N was incorporated into newly synthesized DNA, this heavy DNA molecule could be distinguished from the normal DNA by centrifugation in a cesium chloride (CsCl) density gradient, then they transferred the cells into a medium with normal $^{14}\text{NH}_4\text{Cl}$ and took samples at various definite time intervals, as the cells multiplied and extracted the DNA that remained as double-stranded helices, the various samples were separated independently on CsCl gradients to measure the densities of DNA and thus the DNA that was extracted from the culture one generation after the transfer from ^{15}N to ^{14}N medium, had a hybrid or intermediate density, DNA extracted from the culture after another generation, was composed of equal amounts of this hybrid DNA and of 'light' DNA</p> <p>Conclusion: DNA replication is semiconservative in nature</p>	<p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2} \times 8$</p> <p>1</p>	<p>5</p>
33.	<p>(a)</p> <ul style="list-style-type: none"> • Innate Immunity Innate immunity is non-specific type of defense, that is present at the time of birth. • Innate immunity consists of four types of barriers. - Physical barriers, Skin on our body is the main barrier which prevents entry of the micro-organisms/ Mucus coating of the epithelium lining the respiratory or gastrointestinal or urogenital tracts also help in trapping microbes entering our body - Physiological barriers, Acid in the stomach/saliva in the mouth/ tears from eyes (all prevent microbial growth) - Cellular barriers, Certain types of leukocytes (WBC) of our body like polymorpho-nuclear leukocytes (PMNL-neutrophils) or 	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>	

	<p>monocytes or natural killer (type of lymphocytes) in the blood or macrophages in tissues can phagocytize and destroy microbes.</p> <ul style="list-style-type: none"> - Cytokine barriers, Virus-infected cells secrete proteins called interferons which protect non-infected cells from further viral infection <p style="text-align: center;">OR</p> <p>(b)</p> <ul style="list-style-type: none"> • <i>Plasmodium</i> • When female Anopheles infected with sporozoites bite a healthy person for a blood meal, it introduces the sporozoites with its saliva. • <div style="text-align: center;"> <p>$\frac{1}{2}$ marks</p> <p>Injected sporozoites through the bite of female mosquito enters in liver cells $\xrightarrow{\text{Multiply asexually}}$ $\frac{1}{2}$ marks Released in blood $\xrightarrow{\text{Enter in RBC}}$ $\frac{1}{2}$ marks Sexual stage (gametocyte) develop in RBC</p> <p style="margin-left: 150px;">  </p> </div> <p>(ii)</p> <ul style="list-style-type: none"> • Symptoms – Chill + Fever (high) with headache at regular interval • Bursting of RBCs releases hemozoin that causes these symptoms 	<p>$\frac{1}{2} + \frac{1}{2}$</p> <p>1</p> <p>$\frac{1}{2} + \frac{1}{2}$</p> <p>$\frac{1}{2} \times 4$</p>	<p>5</p>
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