Marking Scheme

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(For Internal and Restricted use only)

Senior School Certificate Examination, 2023

SUBJECT NAME BIOLOGY (SUBJECT CODE 044) (PAPER CODE 57/3/2)

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 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-X, 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 0-70 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).
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 totalling 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 totalling on the title page. ● Wrong totalling 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 un assessed 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 totalled 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, 2023

BIOLOGY (Subject Code-044)

[Paper Code: 57/3/2]

Maximum Marks: 70

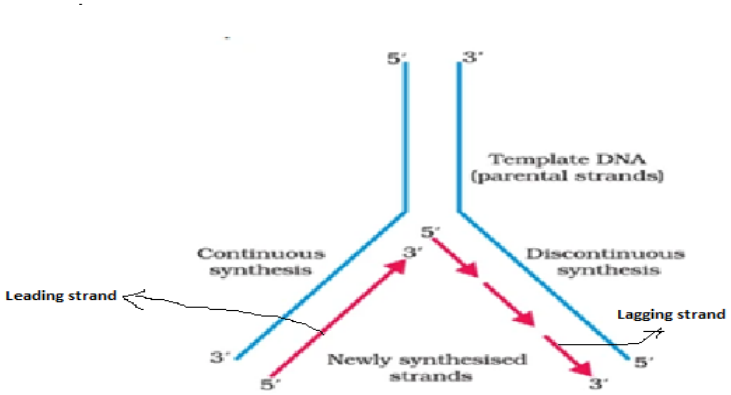
Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION—A		
1.	(c)/ (iii) → (iv) → (i) → (ii) → (v)	1	1
2	(a)/(i) and (iii) only	1	1
3	(a)/ Convergent evolution	1	1
4	(b)/ P-ii, Q-iii , R- iv, S-i	1	1
5	(c) / Point Q	1	1
6	(a)/ FSH and LH // (b)/ LH and Estrogen // (c)/ FSH and Estrogen	1 // 1 // 1	1
7	(b)/ *Rhizobium*	1	1
8	(b)/ (ii) and (iii) only	1	1
9	(a) Individual 1 and 3	1	1
10	(b)/ (iii) only // (d)/ (iii) and (iv) only	1 // 1	1
11	(c)/ Grass – Rabbit – Fox—flea	1	1
12	(a)/ (ii), (iii) and (iv) only	1	1
13	a)/ A and R are true and R is the correct explanation of A.	1	1
14	(a)/ A and R are true and R is the correct explanation of A.	1	1

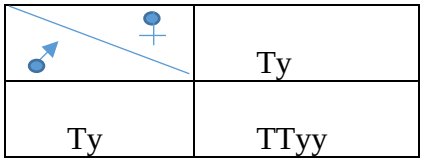
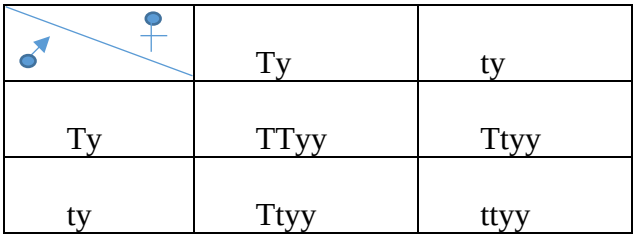
15	(c)/ A is true and R is false.	1	1
16	(c)/ A is true and R is false .	1	1
	SECTION—B		
17	a) •Producers: 1/2/3 • Carnivores: 6/7/8/9 **(half mark for any one correct producer and half mark for any one correct carnivore)** b) • No • Pyramid does not accommodate food web // •Yes •In the given food web no organism occupy more than one trophic level	½ ½ ½ ½ // ½ ½	2
18	(a) Recombinant DNA/Desired DNA is inserted into the coding sequence of an enzyme β-galactosidase , this results into inactivation of the gene for the synthesis of this enzymes, presence of chromogenic substrate gives blue coloured colonies if the plasmid in bacteria does not have the insert(Non recombinants) , but presence of insert (Recombinants) leads to the growth of bacterial colonies with no colour. **OR** (b)A single stranded DNA or RNA tagged with a radioactive molecule (probe), is allowed to hybridize with its complementary DNA in a clone of cells, followed by detection using autoradiography, the clone having the mutated gene will hence not appear on the photographic film. **//** Polymerase Chain Reaction/PCR is used to detect a disease even before any clinical symptoms appears, involves denaturation, annealing, to amplify DNA of the pathogen using pathogen specific primers	½ × 4 ½ × 4 // ½ × 4	2
19	• Mortality/Death rate, the number of deaths in a given population during a given period. • Emigration, the number of individuals who have left the habitat and gone elsewhere during the time period under consideration.	½ ×2 ½ ×2	2
20	(a) Cells of sporogenous tissue/Microspore mother cell/Pollen Mother Cell/(PMC) in anther undergoes meiotic division, to form microspore tetrad which mature and dissociate to form pollen grains or male gametophyte	½ × 2	

	(b) Because its generative cell divides, to form two male gametes.	½ × 2	2
21	(a) *Saccharomyces cerevisiae/* Yeast, is used to ferment grape juice/fermentation to convert sugar into ethanol/ alcohol (b) Methanogens, anaerobically act on cellulosic material in excreta (dung) of cattle to produce biogas which is used as a fuel.	½ ×2 ½ ×2	2
	SECTION—C		
22	(a) • Primary follicle • During fetal stage (b) • Secondary Oocyte • At follicular phase/ between 6-13 day of menstrual cycle • Tertiary follicle grows in size and completes its **first meiotic division** and this unequal division results in a large haploid secondary Oocyte and a tiny first polar body. (c) Progesterone	½ ½ ½ ½ ½ ½	3
23	(a) Darwin's theory could not explain how the variations arise. (b) •Synthetic theory of evolution • origin of species is based on the interaction of genetic variation and natural selection. (c)Mutation, recombinants formed during meiosis/hybridization /crossing over/sexual reproduction	1 ½ ½ ½ ×2	3
24	(a) (i) • 3 types • RNA Polymerase –II (ii) Splicing /Introns are removed and exons are joined in a definite order, undergoes capping /at 5' end where unusual nucleotide (methyl guanosine	½ 1 ½ × 3	

	triphosphate) is added , tailing/ at 3' end where (200-300) adenylate residues are added. **OR** (b) A set of positively charged proteins called histones, due to presence of lysine and arginine(basic amino acids), holds the negatively charged DNA around it in a coiled manner, histones are organised to form a unit of eight molecules (histone octamer), a typical nucleosome contains 200 bp of DNA helix, Nucleosomes constitute repeating units of a structure in nucleus called chromatin thread (like bodies as "beads on string" structure in a nucleus).	½ × 6	3
25	(a) Opioids / Morphine (b) Diacetylmorphine/Smack (c) *Papaver somniferum*/Poppy plant (d) Slows down body function, act as depressant	½ ½ 1 ½ ×2	3
26	(a) Gamete Intra Fallopian Transfer, transfer of an ovum collected from a donor into the fallopian tube of another female who cannot produce an ovum but can provide suitable environment for fertilization and further development/ It has no role in the process of test tube baby program. (b) Zygote Intra Fallopian Transfer, zygote or early embryo up to 8 blastomeres transferred into fallopian tube. (c) Intra Uterine Insemination, semen collected either from husband or a healthy donor is artificially introduced either into vagina or uterus of the female / It has no role in test tube baby program.	½ ×2 ½ ×2 ½ ×2	3
27	(a) • *Meloidegyne incognitia* • Roots (b) By using *Agrobacterium* vector, Nematode specific genes were introduced into host plant, introduction of DNA produced both sense and anti-sense RNA in the host cells these two RNAs being complementary to each other form a double stranded RNA (ds RNA), that initiated RNAi and thus silenced the specific mRNA of the nematode hence parasite could not survive in host.	½ ½ ½ × 4	3
28	(a) Parasitic bird lays resembling eggs in the nest of host bird Cuckoo (Koel) lay eggs in the nest of crow	½ 1	

	//	//	
	Eggs of cuckoo (Koel) have evolved in time to resemble the eggs of the crow, koel lays eggs in the nest of the crow and lets them be hatched there, cuckoo is the parasitic bird here exhibiting brood parasitism. **(or any other correct example**)	½ × 3	
	(b) When evolution of one species is tightly linked with the evolution of other species	½	
	Plant pollinator interaction / fig species and wasp / any other relevant example	1	3
	SECTION—D		
29	(i) Sporozoites	1	
	(ii)Undergoes Asexual reproduction	1	
	(iii) The number increase asexually, parasites ultimately change into gametocytes/ undergoes gametogenesis	½ ×2	
	(iv)(a)Fertilisation and development takes place in host 'X', ultimately forming the infective stage sporozoites.	½ ×2	
	OR		
	(iv) (b) • Bursting of RBCs • Malaria • Haemozoin	½ × 2	
	(Award 1 mark if any two are correct)		4
30	(i) •Sex linked disorder	½	
	•More males are affected in the family as males have only one X chromosome which if affected expresses	½	
	(ii) Recessive disorder	1	
	(iii) C -XX^c; D- XX^c; H- XX^c **'c' is affected allele, accept other symbols used for the same** **(If any two genotypes are correct then award 1 mark)**	½ × 2	

	(iv) (a) Probability 0% **OR** (iv)(b) Probability-50%	1 1	 4
	SECTION—E		
31	(a)(i)  Template strand (Parental strand), Continuous synthesis,Leading strand, discontinuous synthesis,Lagging strand/Okazaki fragments ,Newly synthesized strands, arrow showing the direction of replication(Polarity) **(Award half mark to each correct labelling)** (ii) Parental strand with polarity 5'-3' shows discontinuous synthesis while Parental strand with polarity 3'-5' shows continuous synthesis (iii)DNA dependent DNA polymerase, ligase, Helicase, Topoisomerase, Primase (any two) (iv)*Vicia faba* /Faba bean **OR** (b)Possible genotype: TTyy and Ttyy Case-1 TTyy X TTyy Gamete: Ty, Ty	½ × 5 1 ½×2 ½ ½×2 ½	

	 Phenotype of F1- All tall pea plants with green seeds Conclusion: Given plant is homozygous dominant for plant height and homozygous recessive for seed colour(TTyy) Case-2 Ttyy X Ttyy Gamete: Ty, ty  Phenotype of F1- Tall green : Dwarf green 3 : 1 Conclusion: Given plant is heterozygous for plant height and homozygous recessive for seed colour(Ttyy).	½ ½ ½ ½ ½ ½	5
32	(a) (i) a- Cells of corona radiata. b- Zona pellucida /Perivitelline space c- Haploid nucleus (ii) • Once the sperm enters the cytoplasm of the ovum	½ × 3 ½	

	• The whole process is completed within the fallopian tube. • Entry of sperm in the cytoplasm of the ovum induces the completion of the 2nd meiotic division of the secondary oocyte, it is unequal division and results in formation of a second polar body and a haploid ovum(ootid). (iii)During fertilisation as the sperm comes in contact with the zona pellucida layer of the ovum, it induces changes in the membrane, that block the entry of any additional sperms. **OR** (b) (i) • Double fertilisation is the occurrence of two types of fusion syngamy and triple fusion in an embryo sac of the angiosperm. • Syngamy- Fusion of one of the male gamete and the egg cell resulting in formation of a zygote (diploid). • Triple fusion - Fusion of another male gamete with two haploid polar nuclei to produce a (triploid) primary endosperm nucleus. (ii) (1) Some of the nucellar cells surrounding the embryo start dividing and protrude into the embryo sac to form embryos. (2) In case of Cashew thalamus also contribute in fruit formation along with ovary /development of fruit after fertilisation from the part other than ovary, Guava fruit develops from the ovary after fertilisation.	½ ½ ×2 ½ ×3 1 1 1 1 ½ +½	5
33	(a)(i) • Can act as vector/can self-replicate to form multiple copies/ have selectable markers/ small in size will facilitate insertion / presence of 'Ori' • *E. coli, Agrobacterium tumefaciens, Salmonella typhi*, Bacteria **(or any other correct example)** **(Any two)** (ii)	1 ½ + ½	

	• Ori' – this is a sequence from where replication starts / any piece of DNA when linked to this sequence can be made to replicate with in the host cells controls copy numbe of linked DNA. • Selectable marker helps in identifying and eliminating non-transformants, and selectively permitting the growth of transformants during recombinant DNA technology. (iii) Restriction endonuclease identifies a specific palindromic sequence of DNA and cut the DNA at the specific sites in both the host as well in desired/foreign DNA, thereby **creates "sticky ends"** facilitating ligation to form a recombinant DNA. **OR** (b) (i) Bt cotton crop is pest resistant/Insect resistant/ with increase productivity (ii)Cotton bollworms/corn borer/tobacco budworm/army worm/ coleopterans (beetles)/dipterans (flies, mosquitoes) **(Any Two)** (iii) BT toxin protein exists as an inactive protoxin in the bacterium, but once the insect ingests this toxin it is converted into an active form, due to the alkaline pH of the gut, which solubilizes inactive crystals of toxic insecticide the activated toxin binds to the surface of the midgut epithelial cells of the insect, creates pores, that cause cell swelling and lysis and eventually the death of the insect.	1 ½ ×2 ½ ×2 1 ½ ×2 ½ × 6	5