Marking Scheme
Strictly Confidential
(For Internal and Restricted use only)
Senior School Certificate Supplementary Examination,2023
SUBJECT NAME: BIOLOGY (SUBJECT CODE 044) (PAPER CODE 57/C/3)

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 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 totalling 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 Supplementary Examination, 2023

BIOLOGY (Subject Code–044)

[Paper Code: 57/C/3]

Maximum Marks: 70

Q. No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
	SECTION—A		
1.	(c) / Consanguineous mating.	1	1
2.	(d) / Secretion of relaxin hormone	1	1
3.	(c) / Punnett square	1	1
4.	(b) / They are small circular DNA molecules with their own origin of replication site.	1	1
5.	(c) / S-Phase	1	1
6.	(d) / Molecule- A Morphine ; Source- *Papaver* sp ; Use- Sedative and pain killer	1	1
7.	(a) / P-Thalamus	1	1
8.	(c) / Sense and Antisense RNA.	1	1
9.	(c) / $W_1=W_o e^{rt.}$	1	1
10.	(c) / Snail and Fish	1	1
11.	(b) / *Agrobacterium tumefaciens.*	1	1
12.	(b) /Aravalli Hills- Karnataka.	1	1
13.	(a) / Both (A) and (R) are true and (R) is correct explanation of (A).	1	1
14.	(b) / Both (A) and (R) are true, but(R) is not the correct explanation of (A).	1	1
15.	(c) / (A) is true, but(R) is false.	1	1
16.	(a) / Both (A) and (R) are true, and (R) is the correct explanation of (A).	1	1

	SECTION B		

17.

	Follicular phase	Luteal Phase	
(a) Days of their occurrence in the cycle	6^{th} -13^{th} /6^{th} -14^{th} day	15^{th} -28^{th}/15^{th} -29^{th} day	½
(b) Stage of the follicle	Development of Primary follicle into Graafian follicle	Transformation of Graafian follicle into Corpus Luteum	½
(c) Hormones influencing the phases	LH/FSH/Estrogen	Progesterone	½
(d) State of endometrium	Regeneration of endometrium through proliferation.	Endometrium further proliferate and thickens.	½

(½ **mark to be awarded for every correct difference)**

18.

Features of male flowers: Well exposed stamen, so that pollens are easily dispersed into wind current / light and non-sticky pollen grains, so that they are easily transported in wind current. ½ +½

Features of female flowers: Large often feathery stigma and style wave in the air, to easily trap air borne pollen grains/ numerous flowers packed into an inflorescence, to easily trap air borne pollen grains. ½ +½

(**Or any other features with correct justification)**

19

- Wuchereria bancrofti / Wuchereria malayi — 1
- Through the bite by the female mosquito vectors. — ½
- Chronic inflammation of Lower limbs and genital organs resulting in gross deformities. — ½

2

20.

- DNA is a hydrophilic molecule, — ½
- The bacterial cells are treated with divalent cation such as calcium which increases the efficiency with which DNA enters the bacterium through pores in its cell wall, — ½

	• Foreign DNA can then be forced into such cells by incubating these cells on ice, Followed by placing them briefly at 42^0C (heat shock) and then putting them back on ice, **OR** (a) Restriction enzymes restrict the growth of bacteriophages by cutting their DNA at specific site. (b) Hind II, EcoRI , BamH I, Pst-I, Pvu-I, Sal-I (or any other correct name) **(Any two)**	½ ½ 1 ½ +½	2
21	A molecule that can act as a genetic material must fulfil the following criteria: - It should be able to generate its replica (Replication). - It should be stable chemically and structurally. - It should provide the scope for slow changes (mutation) that are required for evolution. - It should be able to express itself in the form of 'Mendelian characters'.	- ½ x 4	2
	SECTION-C		
22	(a) 'R' Strain | 'S' Strain Non-Virulent | Virulent No polysaccharide coat | Have polysaccharide coat **(½ mark for any one difference)** (b) S strain ⟶ Inject into mice ⟶ Mice die R strain ⟶ Inject into mice ⟶ Mice live S strain (heat killed) ⟶ Inject into mice ⟶ Mice live S strain (heat killed)+ R stain ⟶ Inject into mice ⟶ Mice die Conclusion: He concluded that the R strain bacteria had somehow been transformed by the heat-killed S strain bacteria / Some 'transforming principle' transferred from heat killed S strain and transform R strain into S strain.	½ ½×4 ½	3

23 (a)

Gene	Identification	Contrasting forms
y	Yellow body	Brown body
w	White eye	Red eye
m	Miniature wings	Normal wings

½ + ½

(Consider any two correct points)

(b) Cross A- 1.3%
Cross B- 37.2%

½
½

(c) The genes Yellow and white are very tightly linked and showed very low recombination frequency (1.3%), while white and miniature wing are very loosely linked and showed higher recombination frequency (37.2%) .

½ + ½

3

24

- Penicillin

½

- Alexander Fleming while working on *Staphylococci* bacteria, once observed a mould growing in one of his unwashed culture plates around which *Staphylococci* could not grow, He found out that it was due to a chemical produced by the mould and he named it Penicillin after the mould *Penicillium notatum*.

½×3

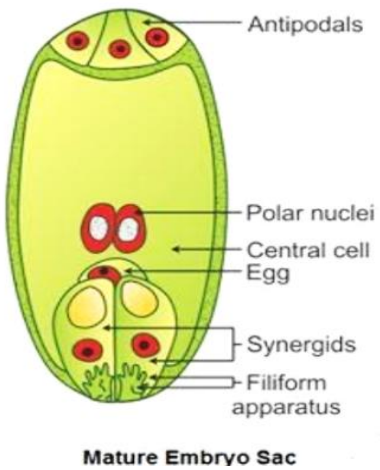
- Alexander Fleming, Ernest Chain , Howard Florey.

½ +½

3

(1/2 mark each for any two correct names)

25 (a)

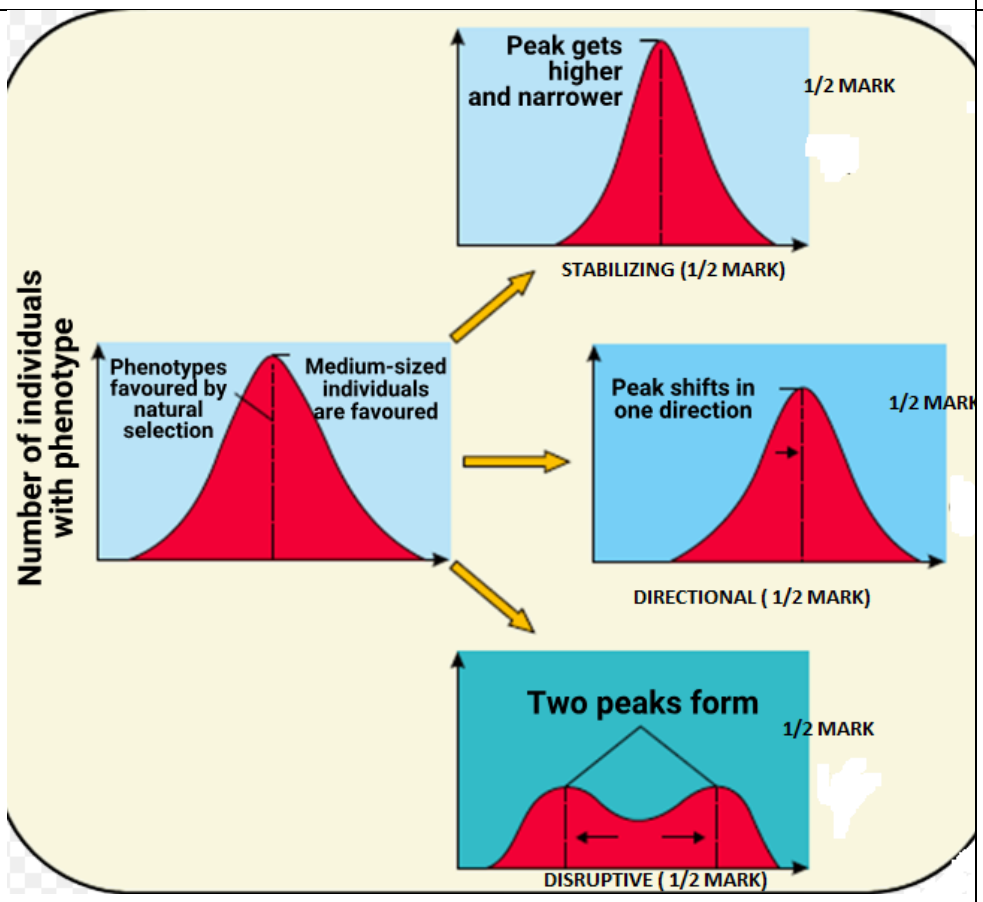


Mature Embryo Sac

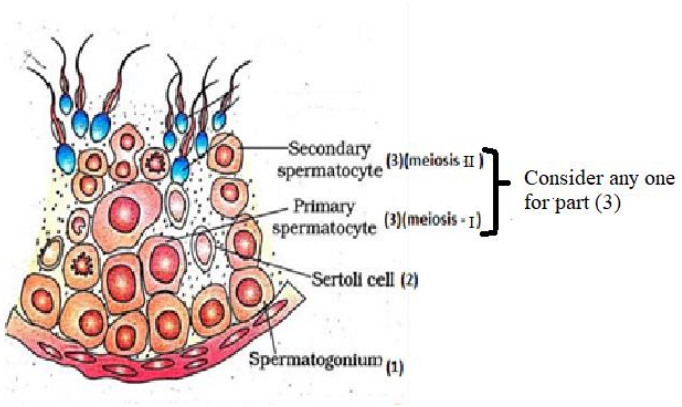
½ × 4

(½ mark each for any 4 correct labellings)

	(b) Guide pollen tube into synergids.	1	3
26	(a) (i) Cryptically colored/ camouflaged (ii) Highly distasteful because of special chemicals present in them , the butterfly acquires this chemical during its caterpillar stage by feeding on a poisonous weed. (iii) Morphological- Presence of thorns Chemicals- Plant produce chemical like cardiac glycoside that make herbivores sick / A wide variety of chemical substances like nicotine caffeine quinine strychnine opium, etc. are produced as defences against grazers and browsers **OR** (b) (i) 'P'- Aquatic 'Q'- Abiotic 'R'- Functional unit of nature where living organisms interaction among themselves and also with the surroundings. 'S'- Organisms (plants, animals, microbes) (ii) Detritus food chain Grazing food chain	½ ½ + ½ ½ 1 ½ ½ ½ ½ ½ ½	3
27	(a) Gel electrophoresis, to separate DNA fragments. (b) (i) Agarose gel, to separate DNA fragments according to their size through sieving effect.	½ +½ ½ +½	

	(ii) Stained with Ethidium bromide followed by exposure to UV light which can be seen as orange coloured DNA band, Separated DNA bands are cut out from the gel and extracted from gel piece (by the process of elution)	½ +½	3
28	 **(½ mark for each figure with correct labelling)**	½×6	3
	SECTION-D		
29	(i) (a) Recombinant DNA technology **OR** (b) Bacterial- Lysozyme, Fungal- Chitinase (ii) Scientist at Eli Lilly company prepared two DNA sequences , corresponding to A and B peptide chains of human insulin, and introduced them in plasmids of E. coli to produce insulin chains ,Chains A and B were produced separately, extracted , and combined by creating disulfide bonds to form human insulin.	1 // ½+½ ½×6	

			4
30	(i) (a) Biodiversity increases as we move from arctic towards tropics/ biodiversity decreases as we move from tropics towards arctic **OR** (b) X- Columbia Y- India/ South America **(Or any other correct name)** (ii) Tropics harbor more biological diversity: - Speciation is generally a function of time unlike temperate regions subjected to frequent glaciations in the past tropical latitudes have remained relatively undisturbed for millions of years and thus had a long evolutionary time for species diversification. - Tropical environments are less seasonal relatively more constant and predictable which promote niche specialization and lead to a greater species diversity. - There is more solar energy available in the tropics which contributes to higher productivity that contributes indirectly to greater diversity.	1 ½×2 1×3	4
	SECTION-E		
31	(a) (i) (1) Initiated – During Embryonic stage (2) Completed- At the time of fertilization (ii) -Oogonia cells start division and enter into prophase-I of the meiotic division and get temporarily arrested at that stage called primary oocytes, each primary oocyte then gets surrounded by a layer of granulosa cells and is called the primary follicle, -The primary follicles get surrounded by more layers of granulosa cells and a new theca and are called secondary follicles, -The secondary follicle soon transforms into a tertiary follicle which is characterized by a fluid filled cavity called antrum. The theca layer is organized into an inner theca interna and an outer	½ ½ ½ +½ 1 1	

	theca externa. The primary oocyte within the tertiary follicle completes its first meiotic division. (It is an unequal division resulting in the formation of a large haploid secondary oocyte and a tiny first polar body), -The tertiary follicle further changes into mature Graafian follicle in which the secondary oocyte forms a new membrane called zona pellucida surrounding it. **OR** (b)(i)  (½ mark for identification and ½ mark for labelling) (ii) • Secretions of accessory glands (seminal vesicles, a prostate and paired bulbourethral glands) constitute the seminal plasma • It is rich in fructose calcium and certain enzymes. • Helps in the lubrication of the penis / essential for maturation / essential for motility of sperms • The seminal plasma along with the sperms constitute the **semen**.	1 3 ½ ½ ½ ½	5
32	(a) (i) Cancer cells appears to have lost the property of contact inhibition as a result they continue to divide to form mass of cells(tumor).	1	

	(ii) When proto-oncogenes are activated under certain conditions it could lead to oncogenic transformation of the cells . (iii) • X-rays/ UV rays/ Nicotine / Caffeine/ Tobacco smoke/ Oncogenic viruses • Damage DNA which causes neoplastic transformation. (iv)	1 ½ ½	

Benign tumors	Malignant tumors
Remain confined to their original location	Not remain confined to their original location/ Show property of metastasis
Cause little damage	Damage surrounding tissue and starve normal cells by competing for vital nutrients

1+1

(1 mark for each correct difference)

OR

(b) (i)

- To make it less polluting

1

- Steps in sewage treatment

-Primary treatment- physical removal of floating debris through sequential filtration and sedimentation
- Secondary treatment/ biological treatment
-primary effluent is passed to large aeration tank where it is constantly agitated and air is pumped into it
-This allow vigorous growth of aerobic microbes into floc which significantly reduces organic matter or BOD
-Flocs are allowed to settle in settling tank this sediment is called activated sludge
-Major part of sludge is pumped into anaerobic sludge digestor to produce biogas

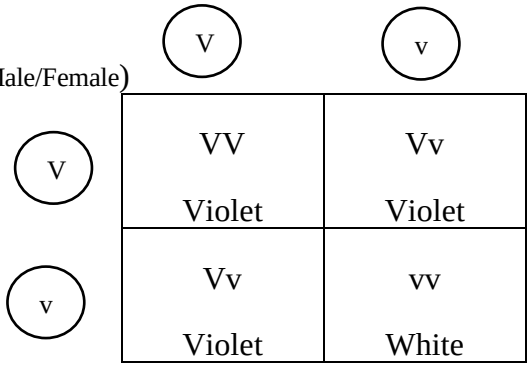
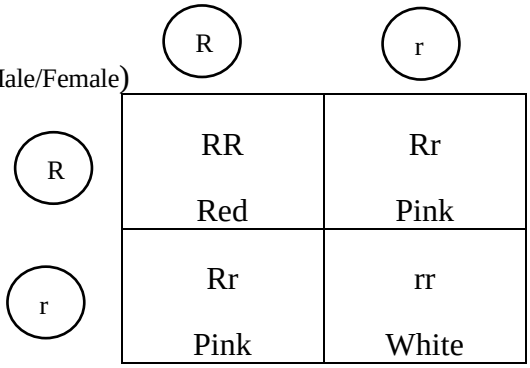
½ × 6

5

(ii) Ganga Action plan, Yamuna action plan ,To build a large number of sewage treatment plants so that only treated sewage may be discharged into the rivers.

(**Any two points to be considered)**

½ +½

33	(a) • In case of Pea plant VV (Violet) X vv (White) ↓ F_1 Vv(violet) ↓ Selfing F_2 Gametes(Male/Female)  Phenotype- Violet:White 3 : 1 It shows Complete dominance • In case of Snapdragon flower / Dogflower /*Antirrhinum* RR (Red) X rr (White) ↓ F_1 Rr(Pink) ↓ Selfing F_2 Gametes(Male/Female)  	½ ½ ½ ½ ½ ½ ½	

	Phenotype- Red:Pink:White 1 :2 :1 One Allele is incompletely dominant over the other allele/ Incomplete dominance. **OR** (b) (i) • Heterogenous nuclear RNA • Eukaryotic cells • RNA polymerase-II (ii) • Yes • hn RNA it is subjected to a process called <u>splicing</u> where the introns are removed and exons are joined in a defined order , In <u>capping</u> an unusual nucleotide (methyl guanosine triphosphate) is added to the 5'-end of hnRNA , In <u>tailing</u> adenylate residues (200-300) are added at 3'-end. • mRNA (iii) mRNA: Provide template for protein synthesis tRNA: Act as adaptor molecule/ brings amino acids and read genetic code	½ ½ ½ × 3 ½ ½ ×3 ½ 1	5