

**Marking Scheme**  
**Strictly Confidential**  
**(For Internal and Restricted use only)**  
**Senior Secondary School Certificate Examination, 2024**  
**SUBJECT NAME BIOLOGY (Q.P. CODE 57/1/3)**

**General Instructions: -**

<b>1</b>	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.
<b>2</b>	<b>“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.”</b>
<b>3</b>	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. <b>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.</b>
<b>4</b>	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.
<b>5</b>	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.
<b>6</b>	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. <b>This is most common mistake which evaluators are committing.</b>
<b>7</b>	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.
<b>8</b>	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.
<b>9</b>	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 “ <b>Extra Question</b> ”.
<b>10</b>	No marks to be deducted for the cumulative effect of an error. It should be penalized only once.
<b>11</b>	A full scale of marks 70 marks as given in Question Paper) has to be used. Please do not hesitate to award full marks if the answer deserves it.
<b>12</b>	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.
<b>13</b>	<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"> <li>● Leaving answer or part thereof unassessed in an answer book.</li> <li>● Giving more marks for an answer than assigned to it.</li> <li>● Wrong totaling of marks awarded on an answer.</li> <li>● Wrong transfer of marks from the inside pages of the answer book to the title page.</li> <li>● Wrong question wise totaling on the title page.</li> <li>● Wrong totaling of marks of the two columns on the title page.</li> <li>● Wrong grand total.</li> <li>● Marks in words and figures not tallying/not same.</li> <li>● Wrong transfer of marks from the answer book to online award list.</li> <li>● 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.)</li> <li>● Half or a part of answer marked correct and the rest as wrong, but no marks awarded.</li> </ul>
<b>14</b>	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.
<b>15</b>	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.
<b>16</b>	The Examiners should acquaint themselves with the guidelines given in the “ <b>Guidelines for Spot Evaluation</b> ” before starting the actual evaluation.
<b>17</b>	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.
<b>18</b>	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.

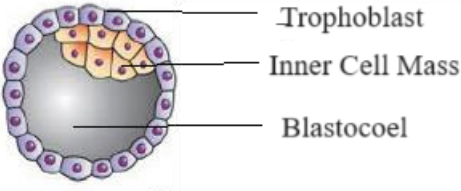
**MARKING SCHEME**  
**Senior Secondary School Examination, 2024**  
**BIOLOGY (Subject Code-044)**  
**[ Paper Code: 57/1/3]**

1.	(B) / Bean Castor Maize	1	1
2.	(C) / N-glycosidic linkage	1	1
3.	(D) / Heterotrophic bacteria	1	1
4.	(D) / Mice	1	1
5.	(C) / Ernst Haeckel	1	1
6.	(B) / Human Chorionic Gonadotropin	1	1
7.	(B) / Histamines	1	1
8.	(B) / 44 × XXY– Overall feminine development	1	1
9.	(A) / Six base pairs	1	1
10.	(C) / Day 10 to 17 of menstrual cycle.	1	1
11.	(D) / <i>Salmonella typhimurium</i>	1	1
12.	(A) / Fish	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.	(C) / Assertion (A) is true, but Reason (R) is false.	1	1
16.	(D) / Assertion (A) is false, but Reason (R) is true	1	1
<b>SECTION - B</b>			
17.	A – Zooplankton , B-Phytoplankton , -Inverted pyramid of biomass , -Sea Ecosystem/ Aquatic ecosystem	½x4	2
18.	-In pre-sterilized flasks life did not come from killed yeast, while in another flask open to air new living organisms arose from ‘killed yeast’.  <b>Conclusion</b> – Dismissal of theory of spontaneous generation / life arise from pre-existing life / proved theory of biogenesis	½+½  1	2
19.	A – Wall of fruit / Wall of ripened ovary , B – Scutellum , C – Radicle / Plumule / epicotyl / hypocotyl , D –Perisperm	½ x4	2
20.	(a) Swiss cheese , large holes in swiss cheese are due to large amount of CO <sub>2</sub> produced by <i>Propionibacterium sharmanii</i> . Roquefort cheese , Ripened by growing specific fungi on them, which give them a particular flavour	½+½  ½+½	2

	<b>OR</b>		
	<p><b>(b)</b>  A –Opioid / Heroin /Smack ,  B – Cannabinoids / Marijuana / Hashish / Charas / Ganja ,  C – Affect Cardiovascular system,  D –Interfere transport of neurotransmitter Dopamine / Euphoria / increased ,  energy / hallucinations /Potent stimulating action on CNS</p>	1/2x4	2
21.	<ul style="list-style-type: none"> <li>• Ova from wife or female donor and sperm from husband or male donor are collected , induced to form a zygote under simulated conditions in the laboratory (<i>In vitro</i>) (outside body) , Zygote or embryo are transferred into the female body for development.</li> <li>• `Test tube baby programme – because initial process is carried out in the laboratory / in vitro</li> </ul>	1/2x3  1/2	2
<b>SECTION – C</b>			
22.	<p>(a) Miller experimentally showed formation of amino acids ,  and this proved theory of chemical evolution of life / formation of organic molecules from inorganic molecules.</p> <p>-Oparin , Haldane</p> <p>(b)Analysis of meteorite content also revealed similar compounds indicating that similar processes are occurring in space.</p>	1/2  1  1/2+1/2  1/2	3
23.	<p>(a)  -‘Beads on String’ / Nucleosomes in Chromatin.  -Under Electron microscope</p> <p>(b)  <ul style="list-style-type: none"> <li>• Dark spots are – Nucleosomes.</li> <li>• -8 molecules of positively charged histone proteins are organized to form histone octamer, and negatively charged DNA is wrapped around it to form nucleosome.</li> </ul> -To accommodate very long DNA helix in nucleus such an organised structure is formed.</p>	1/2  1/2  1/2  1/2+1/2  1/2	3
24.	<p>- No,  Son inherited disease from the mother and daughter inherited disease from both mother and father.</p>	1/2  1/2	

	<p style="text-align: center;">Mother X<sup>C</sup>X (1/2 Mark) Normal (Carrier)</p> <p style="text-align: center;">X</p> <p style="text-align: center;">Father X<sup>C</sup>Y (1/2 Mark) Colour blind</p> <div style="text-align: center;"> <table border="1" style="margin: 10px auto;"> <tr> <td style="text-align: center;">♀ X<sup>C</sup></td> <td style="text-align: center;">X<sup>C</sup></td> <td style="text-align: center;">X</td> </tr> <tr> <td style="text-align: center;">♂ X<sup>C</sup></td> <td style="text-align: center;">X<sup>C</sup>X<sup>C</sup> Colour blind daughter</td> <td style="text-align: center;">X<sup>C</sup>X Carrier daughter</td> </tr> <tr> <td style="text-align: center;">Y</td> <td style="text-align: center;">X<sup>C</sup>Y Colour blind son</td> <td style="text-align: center;">XY Normal son</td> </tr> </table> </div>	♀ X <sup>C</sup>	X <sup>C</sup>	X	♂ X <sup>C</sup>	X <sup>C</sup> X <sup>C</sup> Colour blind daughter	X <sup>C</sup> X Carrier daughter	Y	X <sup>C</sup> Y Colour blind son	XY Normal son	1/2+1/2	
♀ X <sup>C</sup>	X <sup>C</sup>	X										
♂ X <sup>C</sup>	X <sup>C</sup> X <sup>C</sup> Colour blind daughter	X <sup>C</sup> X Carrier daughter										
Y	X <sup>C</sup> Y Colour blind son	XY Normal son										
25.	<p>A – Lymph nodes B – Thymus</p> <p>-Role of Lymph nodes- acts as secondary lymphoid organ/provide site for interaction of lymphocytes with antigens which then proliferate to become cells/ serve to trap the microbes or other antigens which happen to get into lymph or tissue fluid /it activates the lymphocytes and cause immune response.</p> <p>-Role of Thymus- acts as Primary lymphoid organ / provide micro environment for the development and maturation of T- lymphocytes / provide site where immature lymphocytes differentiate into antigen sensitive lymphocytes .</p>	1/2 1/2 1 1	3									
26.	<p>(a)</p> <p>-Orchid Ophrys employs ‘Sexual Deceit’to get pollinated by a species of bee</p> <p>-one petal of flower resembles female of bee in size, colour and markings</p> <p>-Male bee attracted and pseudocopulates the flower and gets dusted with pollens.</p> <p>-When same bee ‘pseudocopulates’ with other flower, it transfers the pollens to it.</p> <p>(b)</p> <p>If female bee pattern changes during evolution the flower needs to co-evolve to resemble the female bee to get pollinated.</p>	1/2 x4 1	3									



	<p>relatively undisturbed for millions of years and had a long evolutionary time for species diversification .</p> <p style="text-align: center;"><b>OR</b></p> <p>(a) Region I represent temperate region subjected to frequent glaciation and get lesser evolutionary time for species diversification / has more seasonal with less constant and less predictable environment which lead to lower specie diversification / have lower solar energy available which reduces productivity and inturn contributes to lesser diversity.</p> <p>(b) Latitudinal gradient in diversity</p> <p>(c) Conventional taxonomic methods are not suitable for identifying microbial species, and many species are not culturable under laboratory conditions.</p>	<p>1</p> <p>1</p> <p>1+1</p>	<p>4</p>
30.	<p>(a) Colony 4 is transformed with plasmid containing recombinant DNA, as they will not show resistance towards tetracycline.</p> <p>(b) <b>Award 2 marks to each student.</b></p> <p>(c) Restriction endonuclease / ligase / <i>Taq</i> DNA Polymerase</p> <p style="text-align: center;"><b>OR</b></p> <p>(c) Insertional inactivation of gene encoding for <math>\beta</math>- galactosidase will lead to colorless bacterial colonies (recombinant)</p>	<p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>2</p> <p>1</p> <p>1</p>	<p>4</p>
<b>SECTION – E</b>			
31.	<p>(i)</p> <div style="display: flex; align-items: center;">  <div style="margin-left: 20px;"> <p><math>\frac{1}{2} \times 2</math>    <b>Any Two</b></p> </div> </div> <p>(Blastocyst) 1/2 Mark</p> <p>(ii)</p> <p>(1) After implantation</p> <p>– finger-like projections appear on the trophoblast called chorionic villi which are surrounded by uterine tissue and maternal blood, Chorionic villi and uterine tissue become interdigitated with each other, and jointly form a structural and functional unit between developing embryo and maternal body called placenta.</p>	<p><math>\frac{1}{2} \times 3</math></p> <p><math>\frac{1}{2} \times 3</math></p>	

(2) Inner Cell Mass differentiates into three germ layers ( outer Ectoderm,middle mesoderm ,inner endoderm)

1/2

(iii)

(1) **Role of Placenta**- It facilitates the supply of oxygen and nutrients to the embryo, it help in removal of CO<sub>2</sub> and excretory waste materials produced by the embryo, it acts as an endocrine tissue and produces hormones hCG or hPL or estrogens .

1/2+1/2

(Any Two Role)

(2)**Role of three germ layers**: They give rise to all tissues/ organs in adults

1/2

OR

(b)

(i)

- They are cleistogamous or closed flowers and hence autogamous so no need of pollinators.
- Because some of nucellar cells surrounding the embryo sac start dividing protrude into embryo sac and develop into embryos.

1/2

1/2

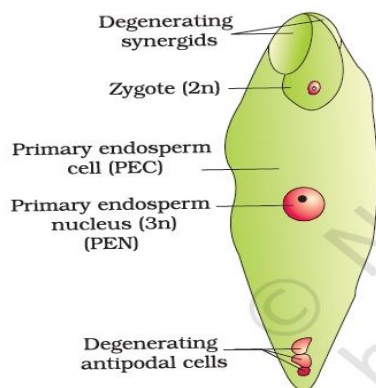
(ii)

- No need of water for pollination or fertilization so seed formation is more dependable
- Seeds have better adaptive strategies for dispersal to new habitats.
- They have sufficient food reserve so nourish the young seedlings until they are capable of photosynthesis on their own.
- They have hard seed coat to protect the young embryos.
- Being product of sexual reproduction they generate new genetic combinations causing variations .

1/2x4

(Any Four)

(iii)



(Label any four parts)

1/2X4

5



32.	(a)		
	(i)		
	-Contact Inhibition is present in normal cells but not in cancer cells,	$\frac{1}{2}$	
	-When normal cells come in contact with other cells it inhibits their uncontrolled growth.	1	
	(ii)		
	Cellular oncogenes / Proto-oncogenes , when Activated under certain conditions could lead to oncogenic transformation of the cells.	$\frac{1}{2} + \frac{1}{2}$	
	(iii)		
	(1) Biopsy and histopathology– A piece of suspected tissue cut into thin sections is stained , and examined under microscope by pathologist for increased cell counts.	$\frac{1}{2} + \frac{1}{2}$	
	(2) MRI – detects cancer of internal organs , uses strong magnetic fields and non–ionising radiations to detect pathological and physiological changes in living tissue	$\frac{1}{2}$ 1	
	<b>OR</b>		
	(b)		
	(i)		
	(1) In aeration tanks there is growth of aerobic microbes and fungi (flocs) that consume major part of organic matter in effluent thus reducing BOD	1	
	(2)		
	-Activated sludge	$\frac{1}{2}$	
	-used as inoculum in aeration tanks.	$\frac{1}{2}$	
	(3) bacterial flocs are allowed to sediment. ( Activated sludge)	1	
	(ii)		
	- <i>Rhizobium</i> (Bacteria), live symbiotically in nodules of roots of leguminous plants and fix atmospheric nitrogen into organic form and provide nitrogen to the plant.	$\frac{1}{2} + \frac{1}{2}$	
	- <i>Glomus</i> (fungi), live in symbiotic association with roots of higher plants and absorb phosphorus from the soil and passes it to plants.	$\frac{1}{2} + \frac{1}{2}$	

	<p>-Cyanobacteria (<i>Anabaena</i>, <i>Nostoc</i>, <i>Oscillatoria</i>), Add organic matter to the soil and increase fertility (Paddy fields)</p>	<p>½+½</p>	<p>5</p>
<p>33.</p>	<p>(a)</p> <p><b>-Frederick Griffith</b></p> <p>Took two strains of <i>streptococcus pneumoniae</i> bacteria and inject them into mice</p> <p>- R strain – Rough and Non–virulent</p> <p>-S strain – Smooth and virulent (with mucous coat)</p> <p>S strain → Inject into mice → Mice die</p> <p>R strain → Inject into mice → Mice live</p> <p>S strain (heat-killed) → Inject into mice → Mice live</p> <p>S strain (heat-killed) + R strain (live) → Inject into mice → Mice die</p> <p>Conclusion :</p> <p>-R–strain bacteria had been transformed by heat killed S – strain.</p> <p>-‘Transforming principle’ transferred from heat killed S-Strain and enabled R–strain to synthesise a smooth polysaccharide coat. This must be due to the transfer of the genetic material.</p> <p>-Heat which killed bacteria did not destroy some of the properties of genetic material which shows stability of genetic material</p> <p style="text-align: center;"><b>OR</b></p>	<p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p> <p>½</p>	

(b) Tall Pea plant with violet flowers can have 4 types of genotypes

$TTVV$  ,  $TtVV$  ,  $TtVv$  ,  $TTVv$

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

**Case I-**  $TTVV$   $\times$   $TTVV$

↓

Genotype  $TTVV$

Phenotype All will be tall and violet.

$\frac{1}{2}$

$\frac{1}{2}$

**Case II-**

$TtVV$   $\times$   $TtVV$

↓

Gametes	TV	tV
TV	$TTVV$ Tall Violet	$TtVV$ Tall Violet
tV	$TtVV$ Tall Violet	$ttVV$ Dwarf Violet

Phenotypic ratio Tall Violet : Dwarf Violet

3 : 1

$\frac{1}{2}$

Genotypic ratio  $TTVV:TtVV : ttVV$

1 : 2 : 1

$\frac{1}{2}$

**Case III-**

$TtVv$   $\times$   $TtVv$

↓

Gametes	TV	Tv	tV	tv
TV	$TTVV$ Tall violet	$TTVv$ Tall Violet	$TtVV$ Tall Violet	$TtVv$ Tall Violet
Tv	$TTVv$ Tall Violet	$TTvv$ Tall white	$TtVv$ Tall Violet	$Ttvv$ Tall white
tV	$TtVV$ Tall violet	$TtVv$ Tall Violet	$ttVV$ dwarf violet	$ttVv$ dwarf Violet
Tv	$TtVv$ Tall violet	$Ttvv$ Tall white	$ttVv$ dwarf violet	$ttvv$ dwarf white

**Phenotypic ratio** - Tall Violet : Dwarf violet:Tall white: dwarf white

9 : 3 : 3 : 1

1/2

**Genotypic ratio-** TTVV: TTVv:TtVV:TtVv:TTvv:ttVV: ttVv: Ttvv: ttvv

1 : 2 : 2 : 4 : 1 :1 :2 :2 :1

1/2

Case IV

TTVv ↓ TTVv

Gametes	TV	Tv
TV	TTVV Tall Violet	TTVv Tall Violet
Tv	TTVv Tall Violet	TTvv Tall White

**Phenotypic ratio-** Tall violet Tall white

3 : 1

1/2

**Genotypic ratio-** TTVV : TTVv : TTvv

1 : 2 : 1

1/2

(Any three self cross shown and explained with genotypic and phenotypic ratio)

5