

Marking Scheme
Strictly Confidential
 (For Internal and Restricted use only)
 Senior Secondary School Supplementary Examination, 2024
 SUBJECT NAME: BIOLOGY (SUBJECT CODE 044 , PAPER CODE 57/S/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 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 0 to 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:- <ul style="list-style-type: none"> ● 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. ● Leaving answer or part thereof unassessed in an answer book. ● 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 Supplementary Examination, 2024
BIOLOGY (Subject Code-044)
[Paper Code: 57/S/3]

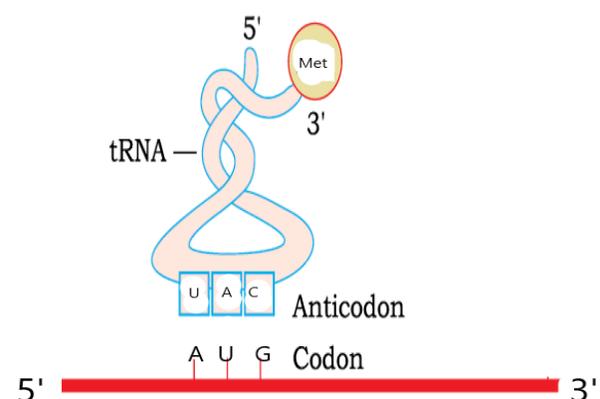
MAXIMUM MARKS:70

Q.No.	EXPECTED ANSWER / VALUE POINTS	MARKS	TOTAL MARKS
SECTION A			
1	(A) / Elephantiasis	1	1
2	(A) / Glomus	1	1
3	(A) / Aquatic plants	1	1
4	(B) / Membrane granulosa of Graafian follicle	1	1
5	(C) / toxin is inactive	1	1
6	(A) / Amensalism	1	1
7	(C) / Ramapithecus	1	1
8	(B) / Ori site	1	1
9	(A) / AUG	1	1
10	(D) / CH ₄ , H ₂ , NH ₃ and water vapour at 800°C	1	1
11	(B) / Determine any genetic disorder of the foetus	1	1
12	(D) / Down's Syndrome	1	1
13	(A) / Both Assertion (A) and Reason (R) are true, and Reason (R) is the correct explanation of Assertion (A)	1	1
14	(B) / Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).	1	1
15	(D) / Assertion (A) is false, but Reason (R) is true.	1	1
16	(B) / Both Assertion (A) and Reason (R) are true, but Reason (R) is not the correct explanation of Assertion (A).	1	1
SECTION B			
17	(a) A- Replication B- Transcription C- Translation (Award 1 mark, if any two are correct) (b) Central dogma states the flow of genetic information in a cell (DNA → RNA → Protein) Viruses in which flows of information is in reverse direction that is from RNA to DNA /HIV/ Retrovirus.	1 ½ ½	2
18	<ul style="list-style-type: none"> To take up the DNA, as the DNA molecule is hydrophilic (it can not pass through cell membrane. By treating host cells with a specific concentration of a divalent cations (like Ca²⁺ ion) and then incubating the cells with rDNA 	½+½	

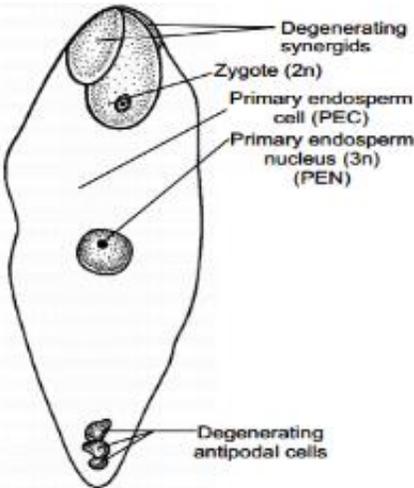
	on ice followed by placing them briefly at 42 ⁰ C (Heat shock) and then putting them back on ice.	1	2								
19	<p>(a)</p> <ul style="list-style-type: none"> They show mutualism, where female wasp uses the fruit not only as an oviposition (egg laying) site but uses the developing seeds within the fruit for nourishing its larvae, in return the wasp pollinates the fig inflorescence. Co-evolution is the phenomenon that operates in their relationship. <p style="text-align: center;">OR</p> <p>(b)</p> <p>Brood Parasitism – the parasitic bird lays its egg in the nest of its host and lets the host incubate them. Example cuckoo (koel) lays their egg in the nest of crow which resemble the host’s egg in size and color / Any other correct example.</p>	<p>½x3</p> <p>½</p> <p>1</p> <p>1</p>	2								
20	<p>Myometrium</p> <ul style="list-style-type: none"> -Smooth muscular layer of uterus -It exhibits strong contraction of the uterus during delivery of the baby (parturition) <p>Endometrium.</p> <ul style="list-style-type: none"> -Glandular -Undergoes cyclic changes during menstruation /implantation of the developing embryo or blastocyst / other events of pregnancy 	<p>½</p> <p>½</p> <p>½</p> <p>½</p>	2								
21	<ul style="list-style-type: none"> Progestogen alone or in combinations with estrogen inhibit ovulation and implantation / alter the quality of cervical mucus to prevent or retard the entry of sperm Their effective periods are much longer than contraceptive pills 	<p>1</p> <p>1</p>	2								
SECTION C											
22	<p>(a)</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%;">Grazing food chain</td> <td style="width: 50%;">Detritus food chain</td> </tr> <tr> <td>Starts with green plants called producers as first trophic level</td> <td>Starts with dead organic matter and decomposers called saprotrophs</td> </tr> <tr> <td>A large fraction of energy flows through aquatic ecosystem .</td> <td>A much larger fraction of energy flows through terrestrial ecosystem.</td> </tr> <tr> <td>Energy for food chain comes from sun</td> <td>Energy for food chain comes from organic remains or detritus</td> </tr> </table>	Grazing food chain	Detritus food chain	Starts with green plants called producers as first trophic level	Starts with dead organic matter and decomposers called saprotrophs	A large fraction of energy flows through aquatic ecosystem .	A much larger fraction of energy flows through terrestrial ecosystem.	Energy for food chain comes from sun	Energy for food chain comes from organic remains or detritus	½ x3	
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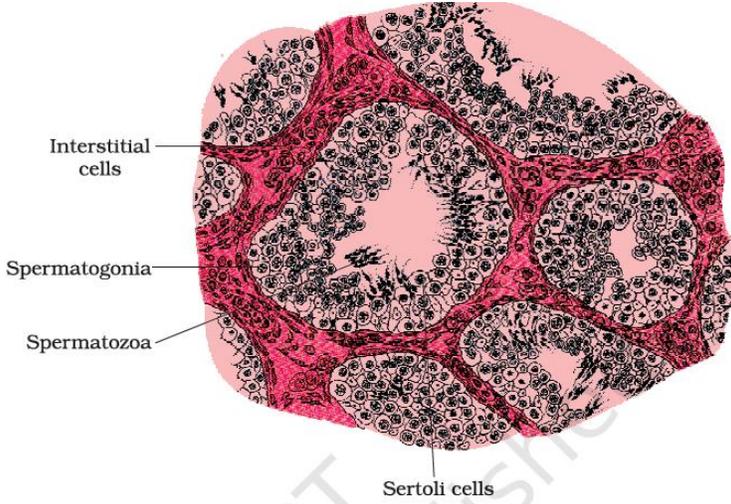
	<p>(b)</p> <table border="1"> <tr> <td>Upright pyramid</td> <td>Inverted pyramid</td> </tr> <tr> <td>It has wide base and narrow apex</td> <td>It has narrow base and wide apex</td> </tr> <tr> <td>Producers are more in number and biomass than herbivore.</td> <td>Producers are less in number and biomass than herbivore.</td> </tr> <tr> <td>Pyramid of energy is always upright</td> <td>Pyramid of biomass in sea is generally inverted</td> </tr> </table> <p style="text-align: center;">(Any other correct difference)</p>	Upright pyramid	Inverted pyramid	It has wide base and narrow apex	It has narrow base and wide apex	Producers are more in number and biomass than herbivore.	Producers are less in number and biomass than herbivore.	Pyramid of energy is always upright	Pyramid of biomass in sea is generally inverted	$\frac{1}{2} \times 3$	3
Upright pyramid	Inverted pyramid										
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Producers are more in number and biomass than herbivore.	Producers are less in number and biomass than herbivore.										
Pyramid of energy is always upright	Pyramid of biomass in sea is generally inverted										
23	<p>(a) (i)</p> <ul style="list-style-type: none"> Bio diversity hot spots are the regions with very high level of species richness and high degree of endemism. Criteria used for determining any region as a hot spot – species richness, endemism <p>(ii) Western Ghats and Sri Lanka, Indo-Burma and Himalayas.</p> <p style="text-align: right;">(Any Two)</p> <p style="text-align: center;">OR</p> <p>(b) Tropical Latitude have remained undisturbed and have had a long evolutionary time for species diversification, tropical environments have less seasonal variations with more constant and predictable environmental conditions to promote niche specialisation for greater diversity, there is more availability of solar energy which contributes to higher productivity.</p>	1 $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3								
24	<p>(a) 'Y' - Fimbriae, Its helps in collection of the ovum after ovulation.</p> <p>(b) 'Z' - Isthmus, Zygote undergoes cleavage to form morula.</p> <p>(c)</p> <ul style="list-style-type: none"> Prophase I of meiotic division. Primary oocyte. 	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2} + \frac{1}{2}$	3								
25	<p>(a) Gene Therapy is collection of methods that allows correction of a gene defect that has been diagnosed in a child / embryo.</p>	1									

	<p>(b)</p> <ul style="list-style-type: none"> • A normal gene is isolated from bone marrow cells, and introduced into the cells at early embryonic stage. • ADA deficiency (adenosine deaminase deficiency) / SCID (severe combined immunodeficiency disease /any other correct genetic disease 	$\frac{1}{2} + \frac{1}{2}$ 1	3										
26	<table border="1"> <tr> <td>Darwin's Evolution</td> <td>deVries Evolution</td> </tr> <tr> <td>Evolution was gradual (stepwise)</td> <td>Evolution occurred in a single step (saltation)</td> </tr> <tr> <td>Variations and natural selection occurs through a number of generations and are responsible for speciation</td> <td>Single step mutation causes speciation</td> </tr> <tr> <td>Variations are small and directional</td> <td>Mutations are random and directionless</td> </tr> <tr> <td>Theory is based on natural selection</td> <td>Theory is based on mutation</td> </tr> </table> <p style="text-align: center;">(Any Three points)</p>	Darwin's Evolution	deVries Evolution	Evolution was gradual (stepwise)	Evolution occurred in a single step (saltation)	Variations and natural selection occurs through a number of generations and are responsible for speciation	Single step mutation causes speciation	Variations are small and directional	Mutations are random and directionless	Theory is based on natural selection	Theory is based on mutation	1x3	3
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27	<p>(a) Offspring 1 Blood Group - A genotype – $I^A i$, Blood Group- B genotype -$I^B i$</p> <p>(b) Offspring 2 Blood Group -A genotype – $I^A i$, Blood Group -O genotype – ii</p> <p>Offspring 3 Blood Group -A genotype – $I^A i, I^A I^A$ Blood Group- AB genotype- $I^A I^B$</p> <p>(Award half mark if blood group along with its possible genotypes is correct)</p>	$\frac{1}{2} + \frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	3										
28	(a) RNA polymerase – III / RNA polymerase	1											

	<p>(b)</p>  <p>5' ————— 3'</p> <p>(½ mark for correct anticodon and ½ mark for correct amino acid)</p> <p>(c) It recognizes the start codon (AUG) and bind to mRNA</p>	<p>½+½</p> <p>1</p> <p>3</p>	
SECTION D			
29	<p>(a)</p> <ul style="list-style-type: none"> • <i>Hind II</i> • It restricts the growth of bacteriophage in <i>E.coli</i>. <p>(b) 5'- GAATTC- 3' 3'- CTTAAG- 5'</p> <p>(c) (i) It inspects the length of a DNA sequence and binds to specific recognition palindromic sequence, and cut each of the two strands at specific points in the sugar – phosphate backbones.</p> <p style="text-align: center;">OR</p> <p>(c) (ii) In EcoRI (comes from <i>Escherichia coli</i> RY13) -E represent Genus <i>Escherichia</i> , -co represent species <i>coli</i>, -R represent RY 13 strain, -I represent order in which the enzyme were isolated from that strain of bacteria.</p>	<p>½ ½</p> <p>1</p> <p>1+1</p> <p>½x 4</p>	<p>4</p>
30	<p>(a) Allergy, the exaggerated response of the immune system to certain antigens present in the environment.</p>	<p>½+½</p>	

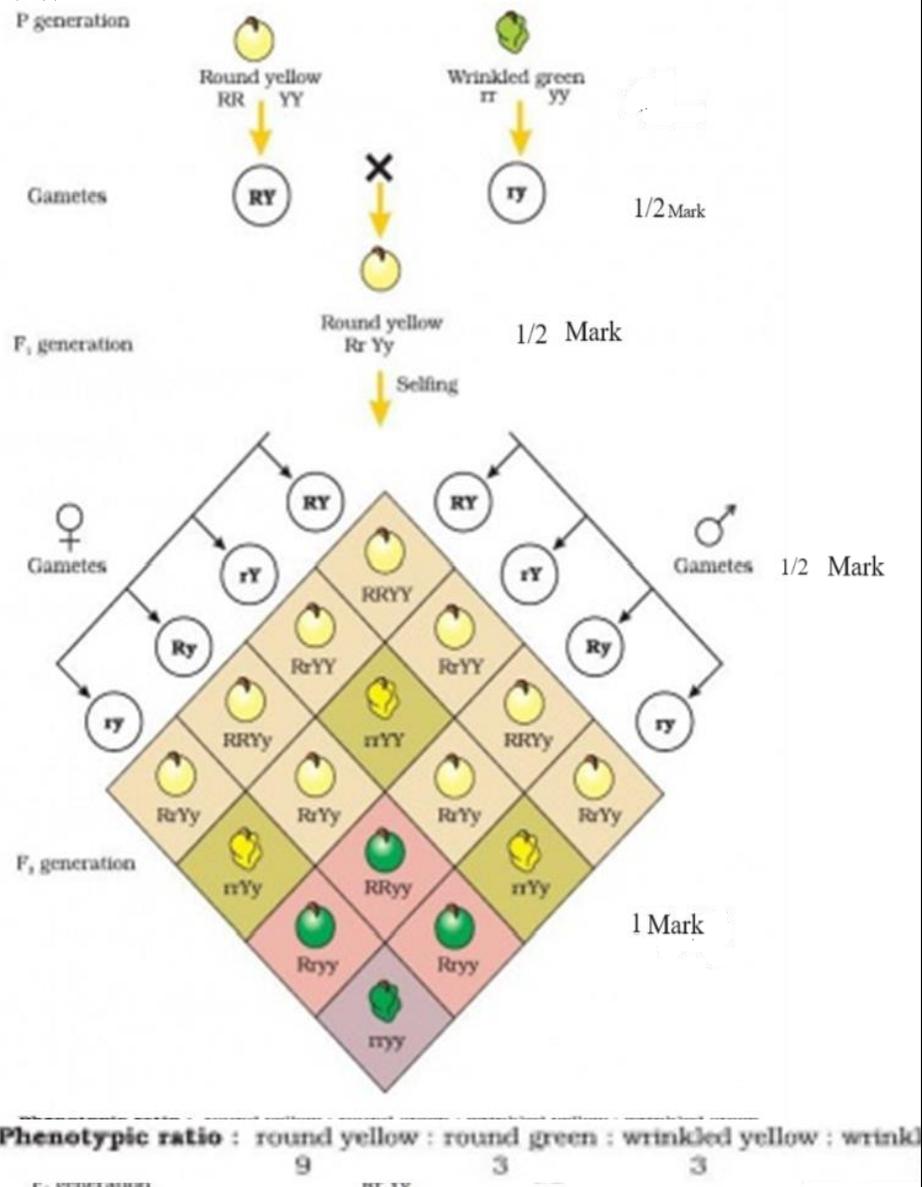
	<p>(b) By analysing the production of IgE type of antibodies / by injecting very small doses of possible allergens and study the reaction.</p> <p>(c) (i)</p> <ul style="list-style-type: none"> - Mast cells - Histamine, serotonin • Drugs are – Anti-histamine, Adrenalin, steroids (any two drugs) <p style="text-align: center;">OR</p> <p>(c) (ii) Yes, lowering of immunity due to modern lifestyle, more sensitivity to allergens, protected environment provided in early life.</p>	<p>1</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2}$</p> <p>$\frac{1}{2} + \frac{1}{2}$</p>	
	SECTION E		
31	<p>(a) (i)</p> <p>During primary treatment the floating debris is removed by sequential filtration, then the grit (soil and small pebbles) are removed by sedimentation, all solids that settle form the Primary sludge, and the supernatant forms the effluent.</p> <p>(ii)</p> <p>Secondary treatment - It is biological treatment in which the primary effluent is passed into large aeration tanks where it is constantly agitated mechanically and air is pumped into it, this allows vigorous growth of useful aerobic microbes into flocs (masses of bacteria associated with fungal filaments to form mesh like structures), while growing these microbes consume the major part of the organic matter in the effluent which significantly reduces the BOD (biochemical oxygen demand) of the effluent, once the BOD of sewage or waste water is reduced significantly the effluent is then passed into a settling tank where the bacterial 'flocs' are allowed to sediment called activated sludge and effluent is released in natural water bodies like river, a small part of the activated sludge is pumped back into the aeration tank to serve as the inoculum, and the remaining major part of the sludge is pumped into large tanks called anaerobic sludge digesters to produce biogas .</p>	<p>$\frac{1}{2} \times 4$</p> <p>$\frac{1}{2} \times 6$</p>	

	<p style="text-align: center;">OR</p> <p>(b) (i) The biogas plant consists of a concrete tank (10-15 feet deep) in which bio-wastes are collected and a slurry of dung is fed, certain bacteria (methanogens) found in anaerobic sludge, help in breakdown of cellulose and production of biogas, outlet pipe of biogas plant connected to supply of biogas to nearby houses.</p> <p>(ii) Methane, CO₂, and H₂</p> <p>(iii) Cow dung is available in large quantities in rural areas, cow dung is rich in methanogen bacteria, cheap, used as manure(sludge), rich in cellulosic material, used for generation of biogas, ecofriendly.</p> <p style="text-align: right;">(Any three)</p>	<p>½x4</p> <p>½x3</p> <p>½x3</p>	<p style="text-align: center;">5</p>
<p>32.</p>	<p>(a) (i)</p> <div style="text-align: center;">  </div> <p style="text-align: center;">(Any four correct labelling)</p> <p>(ii) One of the male gamete fuses with egg called syngamy, results in formation of diploid zygote. Other male gamete fuses with polar nuclei called triple fusion, results in formation of triploid primary endosperm nucleus (3n), Since two types of fusions syngamy and triple fusion takes places in angiosperm it is called double fertilization.</p>	<p>½x4</p> <p>½+½</p> <p>½+½</p> <p>1</p>	

	<p style="text-align: center;">OR</p> <p>(b)(i)</p>  <p>(ii)</p> <pre> graph TD Hypo[Hypothalamus] --> GnRH[GnRH] GnRH --> AP[Anterior Pituitary] AP --> LH[LH] AP --> FSH[FSH] LH --> Leydig[Leydig cells] FSH --> Sertoli[Sertoli cells] Leydig --> Andro[Synthesis and secretion of androgens] Sertoli --> Factor[some factor] Andro --> Stim[Stimulate spermatogenesis] Factor --> Help[Help in spermatogenesis] </pre>	<p style="text-align: center;">$\frac{1}{2} \times 4$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2} + \frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2} + \frac{1}{2}$</p> <p style="text-align: center;">$\frac{1}{2}$</p> <p style="text-align: center;">5</p>	
<p>33.</p>	<p>(a)</p> <p>(i)</p> <ul style="list-style-type: none"> • Lactose acts as an inducer molecule, in its absence repressor protein binds to the operator region • RNA polymerase is prevented from transcribing the operon <p>(ii)</p> <p>By preventing formation of primary transcript, by preventing splicing, by preventing transport of mRNA from nucleus to the cytoplasm, by preventing formation of protein from mRNA (Any two)</p>	<p style="text-align: center;">1+1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1+1</p>	

(b) (i)

OR



1/2

1/2

1/2 Mark

1/2

1/2 Mark

1/2

1 Mark

1

(ii) The law states that ‘when two pairs of traits are combined in a hybrid, segregation of one pair of characters is independent of the other pair of characters’

1

1