

## Marking Scheme

### Strictly Confidential

(For Internal and Restricted use only)

Senior Secondary School Certificate Examination, 2024

SUBJECT NAME BIOLOGY (Q.P. CODE 57/5/3)

#### 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	<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>
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. <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>
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. <b>This is most common mistake which evaluators are committing.</b>
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 totalled up and written in the left-hand margin and encircled. This may be followed strictly.

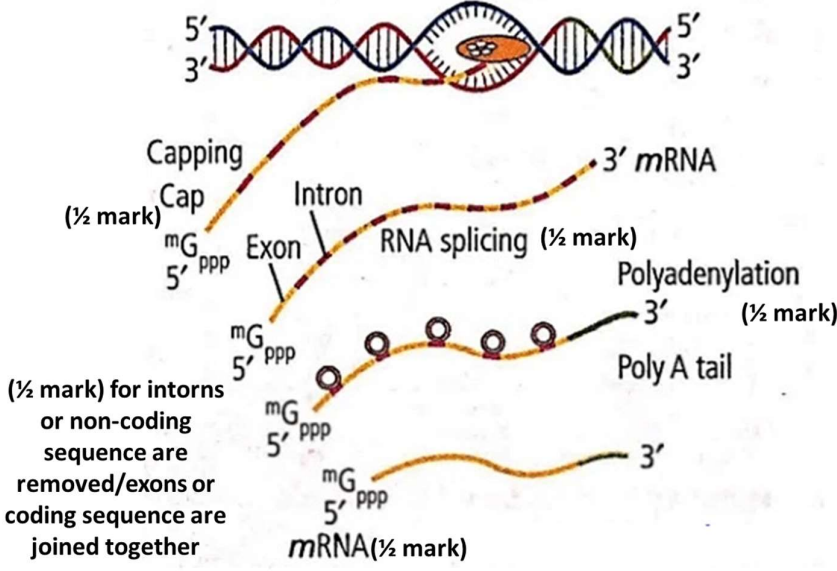
<b>8</b>	If a question does not have any parts, marks must be awarded in the left-hand margin and encircled. This may also be followed strictly.
<b>9</b>	If a student has attempted an extra question, answer of the question deserving more marks should be retained and the other answer scored out with a 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 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.
<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: 57/5/3]**

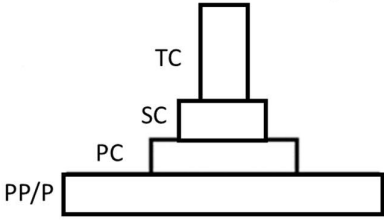
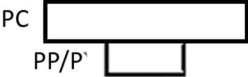
1	(D) / (i) and (ii)	1	1
2.	(C) / Linkage	1	1
3.	(B) / A-degenerating synergids, B-Zygote, C-PEN, D- degenerating antipodals	1	1
4.	(D) / Autosomal recessive	1	1
5.	(D) / Ethidium bromide stained DNA can be seen under UV light	1	1
6.	(A) / Pseudocopulation	1	1
7.	(C) / ICSI	1	1
8.	(D) / Latex of <i>Papaver somniferum</i>	1	1
9.	(D) / A – Flemming B– <i>Staphylococci</i>	1	1
10	(A) / 5' – AUGAAUG – 3'	1	1
.			
11	(C) / (iii), (i), (iv), (ii)	1	1
.			
12	(C) / Chromosome 1 and Y	1	1
.			
13	(D) / (A) is false, but (R) is true.	1	1
.			
14	(C) / Assertion (A) is true, but Reason (R) is false.	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
.			
<b>SECTION - B</b>			
17	Amount of A = T and G = C and A+G = C+T / ratio between Adenine and Thymine and ratio between Guanine and Cytosine are constant and equals one / $A / T = G / C = 1$ , If A = 31 % then T = 31% $\therefore A+T=62\%$ $C + G= 100-62=38\%$ $\therefore C = 38 / 2$  $= 19 \%$	$\frac{1}{2}$  $\frac{1}{2}$  $\frac{1}{2}$  $\frac{1}{2}$	2
18	(a)  <b>Growth curve 'A'</b> – unlimited resources (food and space) or limited competition or in absence of checks or in absence of environmental resistance	$\frac{1}{2}$	

	<p><b>Growth curve 'B'</b> – limited resources or more competition or in presence of checks or in presence of environmental resistance</p> <p>(b) 'K' is the carrying capacity or maximum number of individuals of a population a given habitat can accommodate (beyond which no further growth is possible).</p>	<p>½</p> <p>1</p>	<p>2</p>
<p>19</p>	<p>(a)</p> <ul style="list-style-type: none"> <li>• Enzyme – EcoRI,</li> <li>• Palindrome / palindromic nucleotide sequences.</li> </ul> <p>(b)</p> <ul style="list-style-type: none"> <li>• Indicates the site at which EcoRI makes a cut in the two strands of DNA / restriction sites or recognition sites of EcoRI</li> <li>• thereafter gives rise to “sticky ends.”</li> </ul> <p>The diagram illustrates the action of the EcoRI restriction enzyme. It shows a DNA double helix with the recognition sequence GAATTC. EcoRI cuts between the G and A on both strands, creating sticky ends (AATTAAG). The diagram is divided into two parts: the recognition site and the resulting sticky ends.</p>	<p>½+½</p> <p>½+½</p> <p>½+½</p>	<p>2</p>
<p>20</p>	<ul style="list-style-type: none"> <li>- The primary effluent is passed into (large) aeration tank,</li> <li>- Constantly agitated mechanically and air is pumped into it,</li> <li>- Vigorous growth of useful aerobic microbes (fungi and bacteria) into flocs,</li> <li>- Which consume major part of the organic matter in effluent thus BOD of effluent is reduced.</li> </ul>	<p>½ x 4</p>	<p>2</p>

21	<p>(a)</p> <p>Hybrid seeds show segregation of characters in the progeny, production of hybrid seeds are expensive / apomictic seeds would be cheaper if produced , hybrid seeds have to be produced every year, apomictic seeds brings homozygosity / apomictic seeds retain desirable characteristics of plants.</p> <p style="text-align: right;"><b>(Any two points)</b></p> <p style="text-align: center;"><b>OR</b></p> <p><b>(b) Advantage</b> – used to diagnose any chromosomal abnormality or genetic disorder such as down syndrome, haemophilia, sickle cell anemia in foetus (any one disease) , determine survivability of foetus .</p> <p style="text-align: right;"><b>( Any one point)</b></p> <p><b>Disadvantage</b> – used to determine the sex of the foetus which may lead to female foeticide.</p>	1x2	
	<b>SECTION - C</b>		

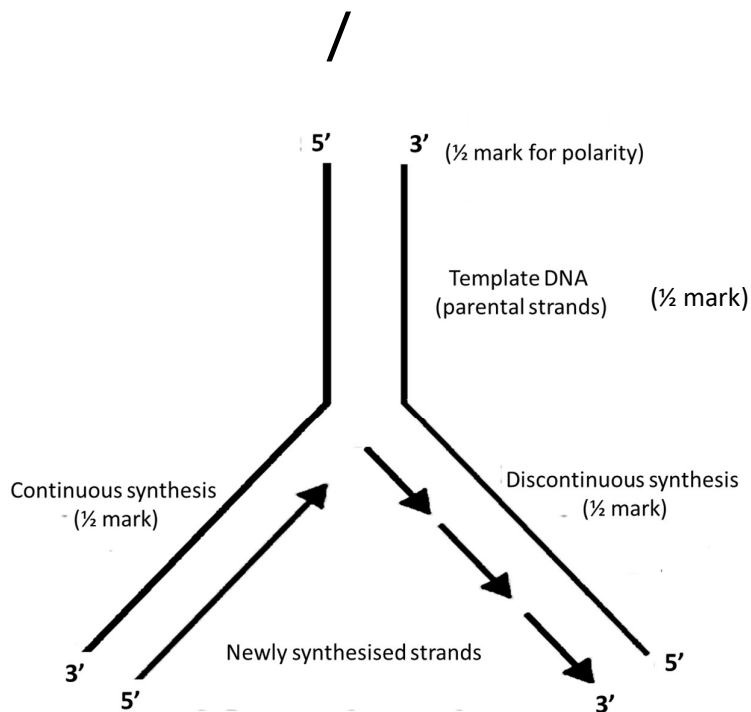
22	<p>- hnRNA undergoes capping at 5'-end (methyl guanosine triphosphate or mGppp), and tailing at 3'-end (with polyA tail or adenylate residues) , Further splicing is carried out, where the non-coding or introns are removed, and coding sequences or exons are joined together in a defined manner</p> <div style="text-align: center;">/</div> 	1/2 x 5	
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	- Site of processing of hnRNA- nucleus.	½	3
23	<p>(a) Colostrum (The yellowish fluid) secreted by mother (during the initial days of lactation) has abundant antibodies or IgA to protect the new born baby or to provide passive immunity</p> <p>(b)</p> <ul style="list-style-type: none"> <li>• Vaccine is a preparation of antigenic proteins of pathogen or inactivated or weakened pathogen.</li> <li>• When a person is vaccinated the antibodies are produced in the body against particular antigens would neutralise the pathogenic agents during actual infection, Vaccines also generate memory B and T cells that recognize the pathogen quickly on subsequent exposure, and overwhelm the invaders with a massive production of antibodies.</li> </ul>	1  ½  ½ x 3	3
24	<p>(a)</p> <ul style="list-style-type: none"> <li>- The tropical region has less seasonal and relatively more constant and predictable environment that promotes niche specialisation leads to greater species diversity.</li> <li>- In the tropical region more availability of solar energy which contributes to higher productivity.</li> <li>- Tropical regions are not subjected to frequent glaciation in the past and remain undisturbed for millions of years hence had a long evolutionary time for species diversification.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <p>(b)</p> <p>(i) Ecological pyramid is the diagrammatic representation of relationship between organisms at different trophic levels (in terms of energy / biomass / number of organisms in an ecosystem).</p> <p>(ii)</p> <p>-Pyramid is upright because number or biomass or energy is more in producers than in the consumers</p>	1  1  1      1	3

	<p>Example: pyramid in grassland ecosystem / any other relevant example to support the shape of pyramid</p> <p>-Pyramid is inverted because number or biomass is less in producers than in the consumers</p> <p>Example: in terms of biomass standing crop of phytoplankton support large standing crop of zooplanktons or large number of insects feeding on a big tree</p> <p style="text-align: center;">/</p> <p>(ii) Diagrammatic representation of any correct example in relevance to the shape of pyramids should be considered</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Pyramid of biomass shows a sharp decrease in biomass at higher tropic levels</p> </div> <div style="text-align: center;"> <math>\frac{1}{2}</math>  <math>\frac{1}{2}</math>  <math>\frac{1}{2}</math> </div> </div> <div style="display: flex; justify-content: space-around; align-items: center; margin-top: 20px;"> <div style="text-align: center;">  <p>Inverted pyramid of biomass- small standing crop of phytoplankton/a big tree supports a large standing crop of zooplankton/large number of insects</p> </div> <div style="text-align: center;"> <math>\frac{1}{2}</math>  <math>\frac{1}{2}</math> </div> </div>	<p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p><math>\frac{1}{2}</math></p> <p>3</p>	
25	<ul style="list-style-type: none"> <li>To combine desirable characters to produce commercially superior varieties,</li> <li>Emasculatation of a bisexual flower, Bagging, Collection of pollen from desired male parent and dusting the pollen grain on stigma, Rebagging.</li> </ul>	<p>1</p> <p><math>\frac{1}{2} \times 4</math></p>	<p>3</p>
26	<p>(a) Animals that have had their DNA manipulated to possess and express an extra or foreign gene or desirable foreign gene.</p> <p>(b) Mice</p>	<p>1</p> <p><math>\frac{1}{2}</math></p>	

	<p>(c)</p> <ul style="list-style-type: none"> <li>- To study the effect of gene on normal physiology and development.</li> <li>- To study how gene contribute the development of disease</li> <li>- To obtain useful biological products</li> <li>- To use in testing the safety of vaccines</li> <li>- For chemical safety testing / used for testing toxicity of drugs.</li> </ul> <p style="text-align: center;"><b>(Any three reasons)</b></p>	<p><math>\frac{1}{2} \times 3</math></p>	<p>3</p>
27	<p>(a)</p> <div style="text-align: center;"> </div> <p>The pyramid of biomass in sea is generally inverted, because the biomass of fishes far exceeds that of phytoplankton.</p> <p>(b)</p> <p>Pyramid of energy will always be upright as energy flow is unidirectional from producers to consumers. / The energy availability of the producers is always more than the consumers. / When the number or biomass of producers are more than the consumers.</p>	<p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>1</p>	<p>3</p>
28	<p>(a)</p> <p>Energetically very expensive process or there is requirement of high energy in the process of replication</p> <p>(b)</p> <p>DNA-dependent DNA polymerases catalyses polymerisation only in one direction that is 5' → 3', On one strand with polarity 3' → 5', the replication is continuous, while on other strand with polarity 5' → 3' the replication is discontinuous</p>	<p>1</p> <p><math>\frac{1}{2} \times 4</math></p>	





No marks will be awarded if polarity is not correctly shown

1/2 x 4

3

**SECTION - D**

29

(a)

Hormone	Source Organ
FSH	Pituitary gland
LH	Pituitary gland
Estrogen	ovary / graafian follicle
Progesterone	ovary / corpus luteum

**(any two hormones with their relevant source organ)**

(b)

Luteal phase or Secretory phase of the menstrual cycle, as endometrium is grown and suitable for implantation of an early embryo or blastocyst.

1/2 + 1/2

1/2 + 1/2

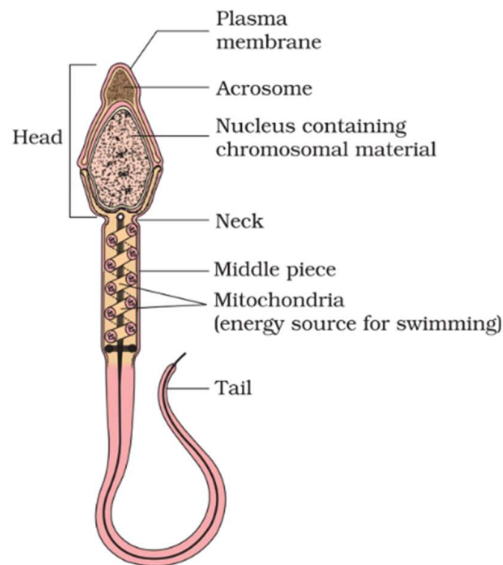
	<p>(c) Estrogen, ovary / graafian (mature) follicles</p> <p>- Endometrium of uterus regenerates through proliferation.</p> <p style="text-align: center;"><b>OR</b></p> <p>(c) If ovum is not fertilized corpus luteum degenerates, progesterone level falls, disintegration of endometrium (and its blood vessels), leading to menstrual flow.</p>	<p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2} \times 4</math></p>	<p>4</p>
<p>30</p>	<p>(a) (i) Sporozoites, (ii) gametocytes</p> <p>(b) -The sporozoites after entering the body need to undergo asexual reproduction in liver and RBC - RBC burst, released haemozoin which is responsible for chill and high fever recurring every 3-4 days.</p> <p style="text-align: center;"><b>OR</b></p> <p>(b) Gametocytes (male and female) enter female mosquito body via blood meal, fertilization in gut / stomach, sporozoites escape from the gut, and migrate into salivary glands (of mosquito)</p> <p>(c) <i>Aedes</i>, - dengue / chikungunya or <i>Culex</i>, - filariasis or elephantiasis <b>(Any other correct example with disease can be considered)</b></p>	<p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p>1</p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2} \times 4</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p>	<p>4</p>

**SECTION - E**

31

(a)

(i)



Head: Contains chromosomal / genetic / nuclear material

Acrosome: Filled with enzymes that helps in fertilisation of the ovum / its secretion help the sperm enter into the cytoplasm of the ovum

Middle piece: Possess mitochondria (which produce energy)

Mitochondria: Produce energy (for the movement of the tail / for swimming)

Tail: Provide motility / helps in swimming

Plasma membrane: Envelop of the sperm / protection (while passing through acidic medium of reproductive tract)

Nucleus: Contains genetic / chromosomal material / DNA

**(any correct four labellings with their respective function)**

$\frac{1}{2} \times 8$   
= 4

(ii)

When a sperm comes in contact with Zona Pellucida (layer of the ovum),it induces changes in the membrane which blocks the entry of any additional sperm.

$\frac{1}{2} +$   
 $\frac{1}{2}$       5

	<p style="text-align: center;"><b>OR</b></p> <p>(b) (i)</p> <p style="text-align: right;"><math>\frac{1}{2} \times 8 = 4</math></p> <p style="text-align: right;">5</p> <p style="text-align: center;"><b>( Eight labellings )</b></p> <p>(ii) Providing nutrition to the developing embryo</p>	<p style="text-align: center;">1</p>	
<p>32</p>	<p>(a) (i)</p> <p>(ii) 'rop' codes for proteins involved in the replication of the plasmid.</p> <p>(iii) It will not be possible to differentiate transformants from the non-transformants or to differentiate recombinants from non-recombinants.</p> <p>(iv) <b>(1 mark to be awarded if attempted)</b></p>	<p style="text-align: center;"><math>\frac{1}{2} \times 4</math></p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p> <p style="text-align: center;">1</p>	



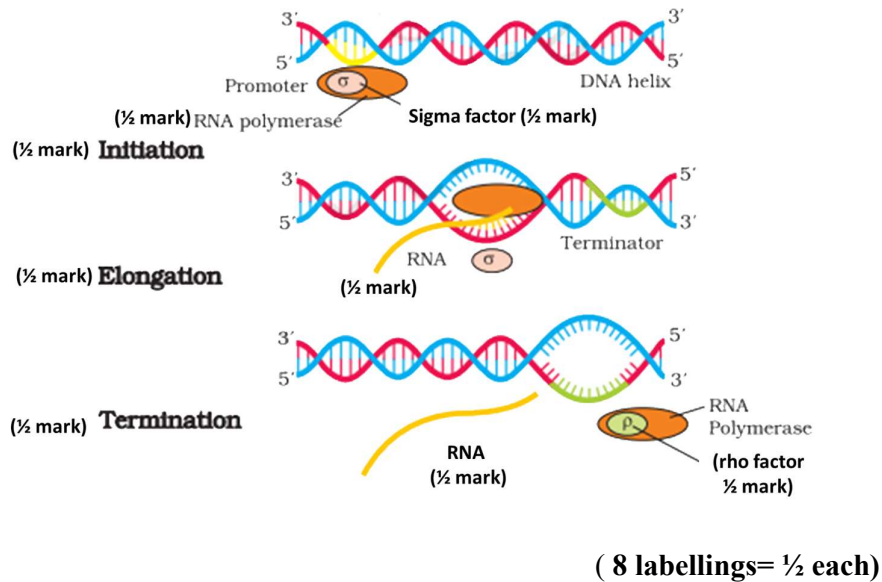
(b)

DNA dependent RNA polymerase binds to promoter and initiate transcription on a DNA template, it uses nucleoside tri-phosphate as a substrate and polymerizes in a template dependent fashion following the rule of complementarity, RNA polymerase associates with the initiation/sigma/ $\sigma$  factor(transiently), facilitate opening of the helix, and continue elongation, once the polymerase reaches terminator region, it binds to rho/ $\rho$ /termination factor and the nascent RNA falls off, RNA polymerase also falls off once the termination is over.

1/2x8

/

In lieu of the above explanation, following diagram may be considered with above marking points



1/2x8

Transcription in Prokaryotes	in	Transcription in Eukaryotes
One type of RNA polymerase catalyses transcription of all 3 types of RNA.		Three different RNA polymerases are required for different 3 types of RNA (RNA Polymerase-I rRNA

		RNA Polymerase–II mRNA RNA Polymerase–III tRNA)		
	No splicing required as only exons are present	splicing is required as both introns and exons are present		1
	No processing of RNA is required as hnRNA is not formed	Processing (capping, tailing and splicing) required as hnRNA is initially formed		
	It occurs in cytoplasm of the cell	It occurs in nucleus of the cell		
<b>(Any one correct corresponding difference=1)</b>				
				5