

**Marking Scheme**  
**Strictly Confidential**  
**(For Internal and Restricted use only)**  
**Senior Secondary School Examination, 2026 (XII<sup>th</sup>)**  
**SUBJECT NAME : Biology (Q.P. CODE 044/57-4-2)**

**General Instructions: -**

<b>1</b>	The CBSE has decided to introduce On Screen Marking (OSM) for the evaluation of Class XII answer Book with the 2026 Examination.
<b>2</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>3</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 Newspaper/Website, etc. may invite action under various rules of the Board and IPC.”</b>
<b>4</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>5</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>6</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>7</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>8</b>	If a question has parts, please award marks on the right-hand side for each part in the OSM Portal. Marks awarded for different parts of the question will be totaled up by the OSM System.
<b>9</b>	If a question does not have any parts, marks must be awarded in the left-hand margin in the OSM Portal. This may also be followed strictly.

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 marks as given in Question Paper) 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). This is in view of the reduced syllabus and number of questions in question paper.
13	<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>• 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>
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	The Examiners should acquaint themselves with the guidelines given in the <b>“Guidelines for Spot Evaluation”</b> before starting the actual evaluation.
16	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.
17	<b>If a candidate attempts both alternatives/options in a question where only one option/ alternative is required to be attempted, the Evaluator shall award marks in both the options. The system will take the higher of two scores and disregard the other response.</b>
18	<b>In a question having two options/alternatives, if a candidate has attempted only one, then the evaluator shall mark “NA” (Not attempted) against the option that has not been attempted by the candidate.</b>

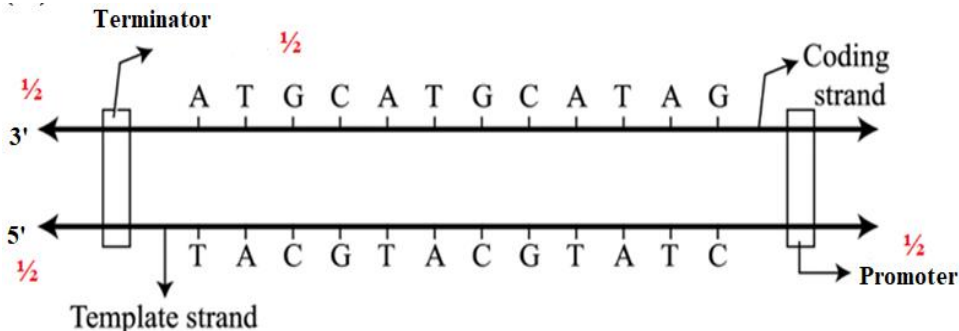
**MARKING SCHEME**  
**Biology (Subject Code-044)**  
**(PAPER CODE : 57/4/2)**

Q.No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
<b>SECTION – A</b>			
1.	(C) / Secondary spermatocytes	1	1
2.	(C) / Synergids	1	1
3.	(C) / (iii) and (iv)	1	1
4.	(D) / Glutamic acid is substituted by valine in the $\beta$ -globin chain at the sixth position	1	1
5.	(B) / <i>Australopithecus</i>	1	1
6.	(C) / (ii) and (iv)	1	1
7.	(C) / <i>Anabaena</i> and <i>Nostoc</i>	1	1
8.	(D) / (i) and (iii)	1	1
9.	(D) / Cutting and extraction of DNA bands from the agarose gel.	1	1
10.	(C) / $\alpha$ -1-antitrypsin	1	1
11.	(B) / <i>Salmonella typhimurium</i>	1	1
12.	(D) / Competition	1	1
13.	(B) / Both Assertion (A) and Reason (R) are true but Reason (R) is <b>not</b> the correct explanation of the Assertion(A)	1	1
14.	(A) / Both Assertion (A) and Reason (R) are true and Reason (R) is the correct explanation of the Assertion (A)	1	1
15.	(B) / Both Assertion (A) and Reason (R) are true but Reason (R) is <b>not</b> the correct explanation of the Assertion(A).	1	1
16.	(B) / Both Assertion (A) and Reason (R) are true but Reason (R) is <b>not</b> the correct explanation of Assertion(A)	1	1
<b>SECTION – B (2 marks)</b>			
17.	(a) In some species (Asteraceae and grasses) the diploid egg cell is formed without reduction division and develop into an embryo without fertilization such are apomictic seeds. / Some of the nucellar cells surrounding the embryo sac starts dividing and protrude into the embryo sac and develop into an embryo.	1	

[illegible]

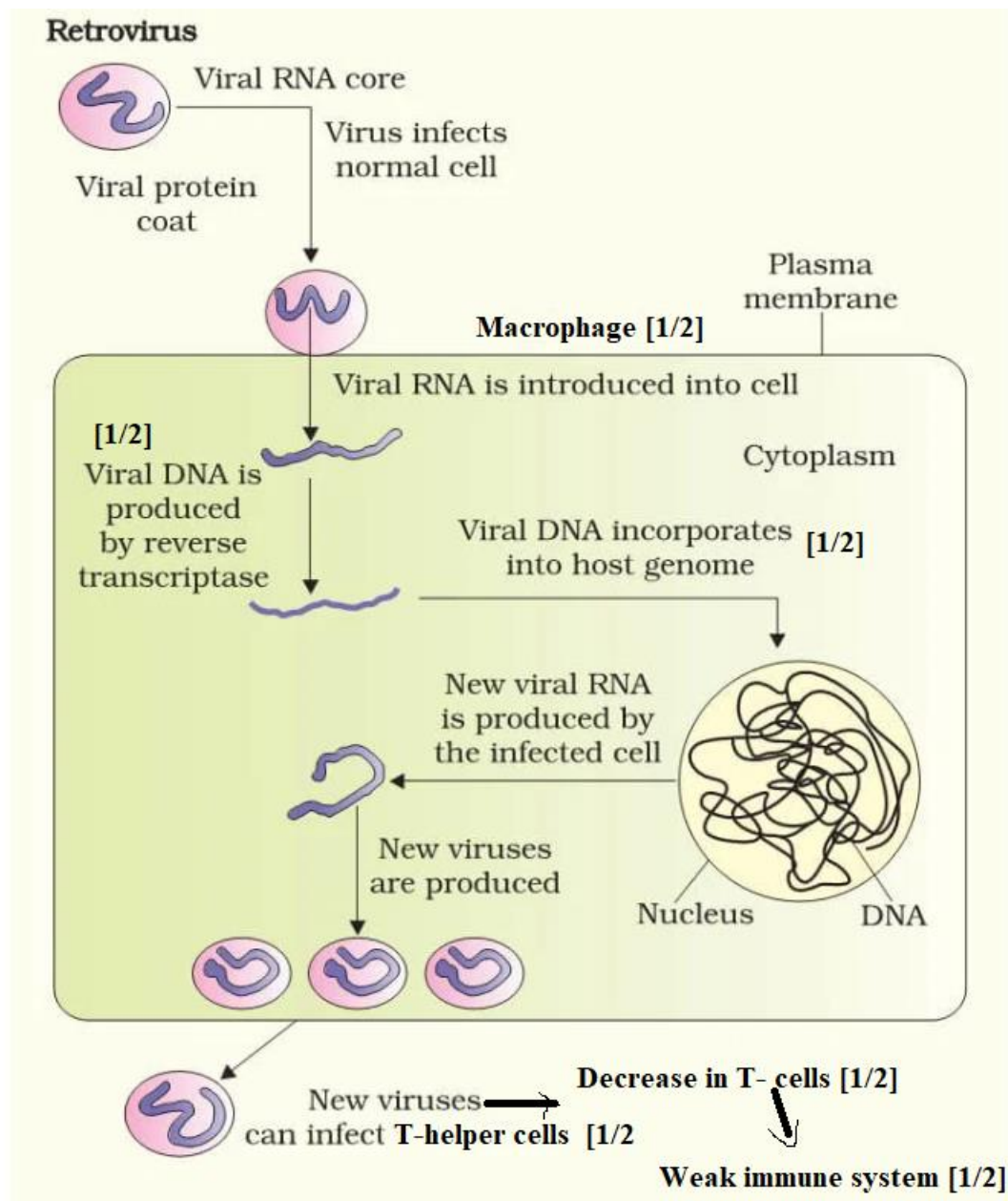


	<div data-bbox="295 141 592 398"> </div> <div data-bbox="220 427 1305 501"> <p>- Disruptive – more individuals acquire peripheral character value at both ends of the distribution curve two peaks are formed.</p> </div> <div data-bbox="220 517 724 745"> </div> <div data-bbox="746 801 774 840"> <p>//</p> </div> <div data-bbox="236 893 1240 1579"> </div>	<div data-bbox="1361 208 1390 241"> <p>1/2</p> </div> <div data-bbox="1361 432 1390 465"> <p>1/2</p> </div> <div data-bbox="1361 600 1390 633"> <p>1/2</p> </div> <div data-bbox="1345 1059 1406 1093"> <p>1/2x6</p> </div>	<div data-bbox="1513 1552 1533 1585"> <p>3</p> </div>
<p>24.</p>	<div data-bbox="220 1615 1294 1973"> <p>(a)</p> </div>	<div data-bbox="1345 1776 1406 1809"> <p>1/2x4</p> </div>	

	<p>(b) The RNA transcribed is 5'A U G C A U G C A U A G 3'</p> <p style="text-align: center;">//</p> <p>(a)</p>  <p>(b) The RNA transcribed as 5 'G A U A C G U A C G U A 3'</p>	1	
		$\frac{1}{2} \times 4$	
		1	3
25.	<p>(a)</p> <ul style="list-style-type: none"> <li>Primary productivity- The amount of biomass or organic matter produced per unit area over a time period by the plants during photosynthesis.</li> <li>It varies in different ecosystem depending upon–</li> </ul> <p>-The plant species inhabiting a particular area. -The environmental factors. - Photosynthetic capacity of plants - Availability of nutrients</p> <p style="text-align: right;">(Any two)</p> <p>(b) Herbivores are the primary consumers the rate of assimilation or formation of new organic matter at the consumer level is secondary productivity.</p>	1  $\frac{1}{2}$ $\frac{1}{2}$	3
26.	<p>(a) Ex-situ conservation</p> <p>(b)</p> <p>-Cryopreservation – (–196<sup>0</sup>C) sperms or eggs or animal tissues or gametes and embryos of threatened species can be stored. -In vitro using tissue culture methods plants can be propagated -Seed banks in which seeds of different genetic strains of commercially important plants can be kept. - Botanical Gardens in which threatened plants can be conserved in special settings. -Any other correct option with explanation.</p> <p style="text-align: right;">(Any two)</p>	$\frac{1}{2}$  1+1	

	(c) Botanical Gardens , Wildlife safari parks (Any one)	$\frac{1}{2}$	3
27.	<p>(a) Proinsulin contains an extra stretch called the C-peptide in addition to chain A and B / C-peptide is not present in the (mature) insulin.</p> <p>(b) Steps to produce insulin through rDNA technology.</p> <ul style="list-style-type: none"> <li>- Eli Lilly an American Company prepared two DNA sequences corresponding to A and B chain of human insulin.</li> <li>- These chains A and B were then introduced in plasmid <i>E.coli</i> to produce multiple copies.</li> <li>- These chains were extracted of separately.</li> <li>- Chain A and B were combined by creating disulphide bonds to form human insulin.</li> </ul>	<p>1</p> <p><math>\frac{1}{2} \times 4</math></p>	3
28.	<p>(a)</p> <ul style="list-style-type: none"> <li>-HIV attacks Macrophages first.</li> <li>-RNA genome starts producing viral DNA by reverse transcriptase.</li> <li>-The viral DNA gets incorporated into the DNA of host cell and directs the infected cells to produce viral particles.</li> <li>-The new viruses are released from the macrophages and they start infecting helper T lymphocytes (<math>T_H</math>).</li> <li>-Progressive decrease in helper T-lymphocytes takes place.</li> <li>-So the immune system of infected person becomes weak and start suffering from infections.</li> </ul> <p style="text-align: center;">//</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>	





OR

(b)

Sporozoites are infected into human body by the bite of female Anopheles.

$\frac{1}{2}$



Sporozoites reach in liver cells through blood.

$\frac{1}{2}$



The parasite reproduces asexually in liver and by bursting the liver cells and new cells are released into blood.

$\frac{1}{2}$



Enter into the RBCs and reproduce asexually

$\frac{1}{2}$



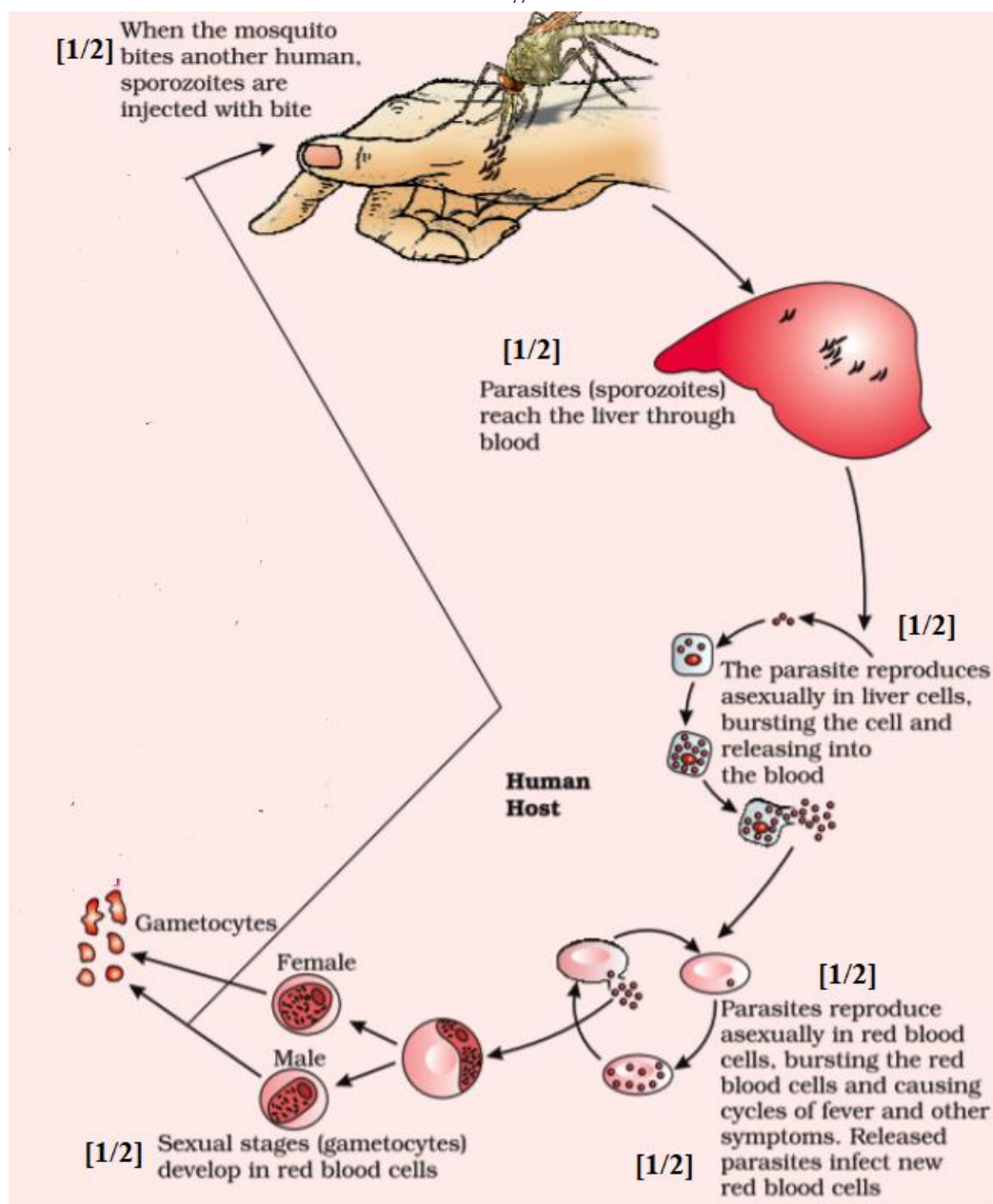
Rupture of RBCs and release of haemozoin

$\frac{1}{2}$



New cells of parasite enter new RBCs and undergo gametogenesis to produce male and female gametocytes.

$\frac{1}{2}$



$\frac{1}{2} \times 6$

3

#### SECTION – D (4 marks)

29.

(a) B – lymphocytes /B cells , and T – lymphocytes/ T Cells

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

(b) (i) Physical barrier , physiological barriers , Cellular barriers , Cytokine barriers  
(any two)

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

OR

(b) (ii) Our immune system has the ability to distinguish between ‘self’ and ‘non-self’ cells or tissues.

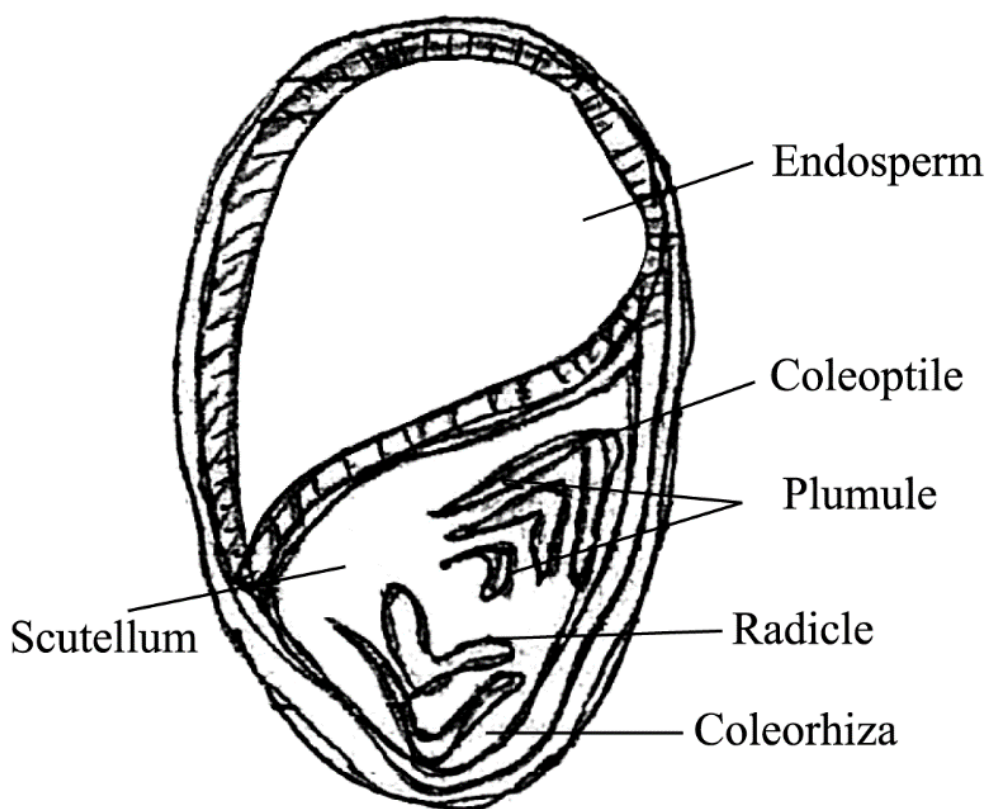
1

(c)

		<div>Active Immunity</div> <div>When antibodies are produced in our body in response to an antigen then it is called active immunity</div> <div>It is slow and take time to give its full effective response</div> <div>It lasts for longer period,</div> <div>Memory cells are formed</div>	<div>Passive Immunity</div> <div>When preformed or ready made antibodies are injected into the body for protection then it is called passive immunity.</div> <div>It gives quick response</div> <div>It last for shorter period</div> <div>Memory cells are not formed</div> <div>(any two correct difference)</div>	1+1	4
30.	<div>(a) It is necessary for the entry of lactose into the cell.</div> <div>(b)(i) In the presence of lactose the repressor is inactivated by the interaction with the inducer that allow RNA polymerase access to promoter and transcription proceeds.</div> <div>OR</div> <div>(b)(ii) It is called negative regulation because the operon is switched off in the absence of inducer and transcription is prevented.</div> <div>(c) - In the absence of the inducer the repressor binds to the operator and prevents transcription of the structural gene.</div> <div>- When inducer or lactose is present it prevents the repressor from binding to the operator hence regulation is at the transcriptional level.</div>			<div>1</div> <div>1</div> <div>1</div> <div>1</div> <div>1</div>	4
	SECTION – E (5 marks)				
31.	<div>(a) (i)</div> <div>(I) Naming of restriction enzymes (EcoRI):</div> <div>-First letter ‘E’ of the name comes from genes (<i>Escherichia</i>)</div> <div>- The second two letters ‘co’ come from the species (<i>coli</i>)</div> <div>-The letter ‘R’ derived from the name of the strain</div> <div>- Roman number (1) indicate the order in which the enzymes were isolated from the strain of the bacteria.</div>			<div>½</div> <div>½</div> <div>½</div> <div>½</div>	

	<p><b>(II)</b> The restriction enzyme EcoRI recognised the palindromic sequence</p> <p>5' – G↓AATTC – 3'</p> <p>3' – CTTAA↑G – 5'</p> <p><b>(a) (ii)</b></p> <ul style="list-style-type: none"> <li>• These overhanging stretches are called 'Sticky ends'</li> <li>• They form hydrogen bond with their complementary cut counterpart that facilitates the action of enzyme DNA ligase.</li> </ul> <p style="text-align: center;"><b>OR</b></p> <p><b>(b)</b></p> <p><b>(i)</b></p> <ul style="list-style-type: none"> <li>- When the alien DNA is inserted within the coding sequence of the enzyme β - galactosidase it results in inactivation of the enzyme which is referred as insertional inactivation.</li> <li>- The presence of chromogenic substrate gives blue coloured colonies if the plasmid in the bacteria does not have insert or is non recombinant.</li> <li>- Colonies which do not produce any colour are identified as recombinants as their gene for enzyme is inactivated due to an insert.</li> </ul> <p><b>(ii)</b> <i>Agrobacterium tumefaciens</i>.</p> <p><b>(iii)</b> When the <i>Agrobacterium</i> infects a plant cell it delivers 'T'-DNA or Ti tumor-inducing plasmid into the plant cell and transforms it into a tumor cell.</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>	5
32.	<p><b>(a)</b></p> <ul style="list-style-type: none"> <li>- Gonadotropin releasing hormone/ GnRH , It stimulates the pituitary gland to release follicle stimulating hormone or FSH and Luteinising hormone or LH both act on ovary.</li> <li>- FSH/ Follicle stimulating hormone , stimulate follicular development and secretion of estrogen by the follicle cells.</li> <li>- LH/ Luteinising hormone , stimulates ovulation/ formation of corpus luteum from the ruptured graafian follicle.</li> <li>- Progesterone , Maintenance of endometrium necessary for implantation and other events of pregnancy.</li> <li>- Estrogen , responsible for the maturation of primary follicle into graafian follicle/ regeneration of endometrium lining.</li> </ul> <p style="text-align: center;"><b>OR</b></p>	<p>½+½</p> <p>½+½</p> <p>½+½</p> <p>½+½</p> <p>½+½</p>	

(b)(i)



$\frac{1}{2} \times 6$

( $\frac{1}{2}$  mark for any 6 correct labelling)

(b)(ii)

•

Perisperm	Endosperm
In seeds residual persistent nucellus is called perisperm.	It is the product formed from the primary endosperm cell in the ovule.
The cells are diploid (2n)	Cells are triploid (3n)
( any one)	

1

• Examples :

Perisperm	Endosperm
Eg. Black pepper / beet/ any other example	eg. Castor / Wheat/ Maize/Barley/ Sunflower/ Coconut/any other example

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

5

33.	<p>(a)</p> <ul style="list-style-type: none"><li>Types and location of gene:</li></ul> <p>–<math>\alpha</math>- Thalassemia is under the control of two genes HBA1 and HBA2 , both located on chromosome-16.</p> <p>–<math>\beta</math>- Thalassemia is the control of a single gene HBB , present on chromosomes -11.</p> <ul style="list-style-type: none"><li>Causes:</li></ul> <p>It is due to mutation / deletion of one or more of the four alleles of the genes controlling the disease.</p> <ul style="list-style-type: none"><li>Symptoms:</li></ul> <p>Anaemia/ extreme tiredness / pale skin/ Breathlessness/ any other correct symptom</p> <ul style="list-style-type: none"><li></li></ul> <table><tr><th>Thalassemia</th><th>Sickle cell anaemia</th></tr><tr><td>It is quantitative where less amount of haemoglobin is synthesised.</td><td>It is qualitative where defective haemoglobin is synthesised.</td></tr><tr><td>Both <math>\alpha</math> and <math>\beta</math> chain are affected.</td><td>Only <math>\beta</math> chain is affected.  (any one)</td></tr></table> <p>OR</p> <p>(b)</p> <p>(i) Major goals of HGP:</p> <ul style="list-style-type: none"><li>Identify all the genes (20,000-25,000 in human DNA)</li><li>Determine the sequence of the three billion base pairs present in human DNA</li><li>Store the information in database.</li><li>Improve the tools for data analysis.</li><li>Transfer the technologies to other sectors (like industries).</li><li>Address the ethical legal and social issues(ELSI) that may arise from this project.</li></ul>	Thalassemia	Sickle cell anaemia	It is quantitative where less amount of haemoglobin is synthesised.	It is qualitative where defective haemoglobin is synthesised.	Both $\alpha$ and $\beta$ chain are affected.	Only $\beta$ chain is affected.  (any one)	<p><math>\frac{1}{2}+\frac{1}{2}</math></p> <p><math>\frac{1}{2}+\frac{1}{2}</math></p> <p>1</p> <p>1</p> <p>1</p> <p><math>\frac{1}{2} \times 4</math></p>	
Thalassemia	Sickle cell anaemia								
It is quantitative where less amount of haemoglobin is synthesised.	It is qualitative where defective haemoglobin is synthesised.								
Both $\alpha$ and $\beta$ chain are affected.	Only $\beta$ chain is affected.  (any one)								

	<p style="text-align: right;"><b>(any four)</b></p> <p><b>(ii) Methodologies :</b></p> <ul style="list-style-type: none"> <li>- Expressed Sequence Tags (ESTs) , It focuses on identifying all the genes that are expressed as RNAs.</li> <li>- Sequence Annotation , it aims at sequencing the whole set of genome that includes all coding sequences and non coding sequences and then assigning functions to different regions in the sequence.</li> <li>-</li> </ul> <p><b>(iii)</b></p> <ul style="list-style-type: none"> <li>• Yeast artificial chromosomes</li> <li>• It is used as vector.</li> </ul>	<p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p> <p><math>\frac{1}{2} + \frac{1}{2}</math></p>	<p style="text-align: right;"><b>5</b></p>
	- o O o -		