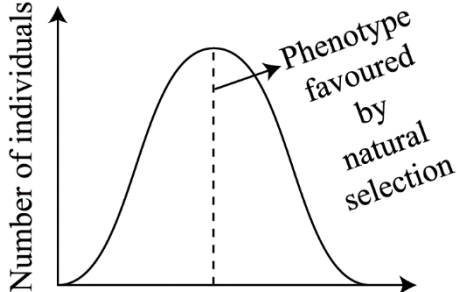
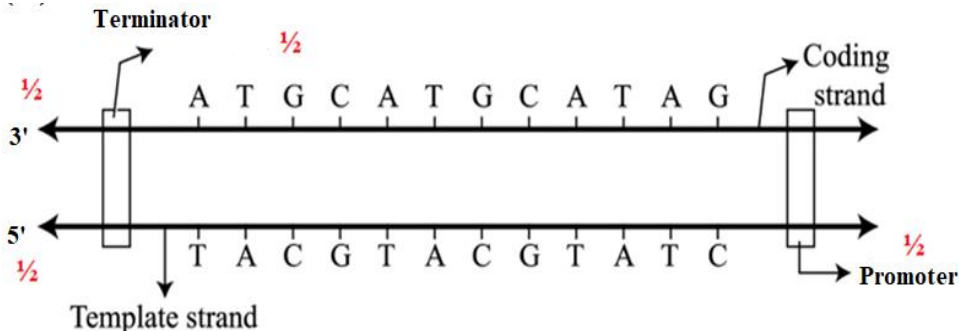


SOLUTIONS
Biology (Subject Code-044)
(PAPER CODE : 57/4/2)

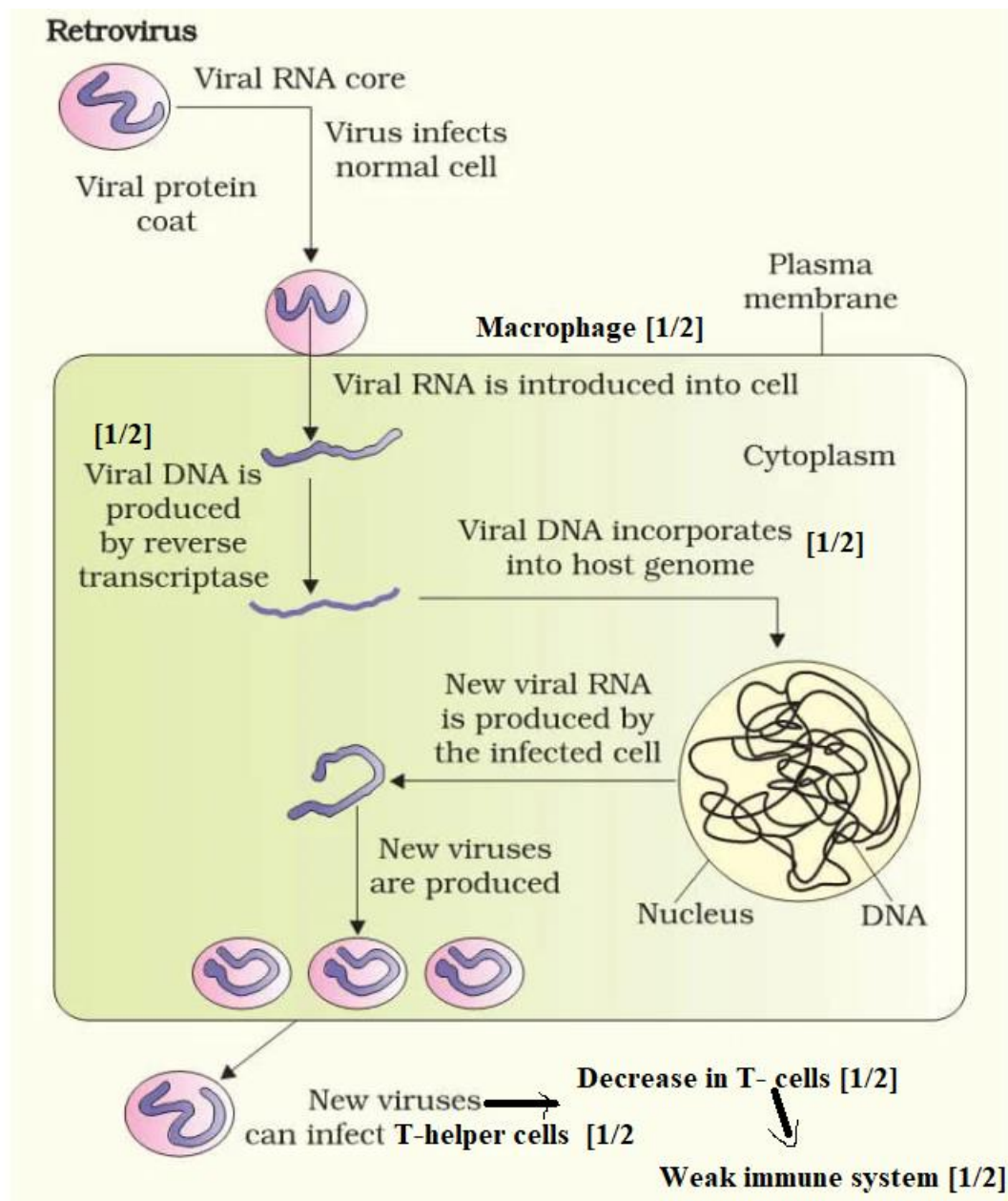
Q.No.	EXPECTED ANSWER / VALUE POINTS	Marks	Total Marks
SECTION – A			
1.	(C) / Secondary spermatocytes	1	1
2.	(C) / Synergids	1	1
3.	(C) / (iii) and (iv)	1	1
4.	(D) / Glutamic acid is substituted by valine in the β -globin chain at the sixth position	1	1
5.	(B) / <i>Australopithecus</i>	1	1
6.	(C) / (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) / α -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 not 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 not the correct explanation of the Assertion(A).	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 (2 marks)			
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	

	(ii) Measured as - biomass i.e mass of living organisms (dry weights) in an unit area. - number per unit area.	$\frac{1}{2}$ $\frac{1}{2}$	2																								
	SECTION – C (3 Marks)																										
22.	<table><tr><th>Wind pollinated flowers</th><th>Insect Pollinated flowers</th></tr><tr><td>Flowers are dull or not colourful</td><td>Flowers are colourful</td></tr><tr><td>Flowers do not produce nectar</td><td>Flowers produce nectar</td></tr><tr><td>Flowers are not fragrant</td><td>Flowers are fragrant</td></tr><tr><td>Flowers are generally of small size</td><td>Flowers are of large size</td></tr><tr><td>Pollen grains are produced in large numbers.</td><td>Pollen grains are not produced in large numbers</td></tr><tr><td>Pollen grains are light weight and non sticky.</td><td>Pollen grains are heavy and sticky</td></tr><tr><td>Often have feathery stigma to easily trap air borne pollens</td><td>Stigma is often non feathery</td></tr><tr><td colspan="2">Any other correct difference (Any four)</td></tr></table> - Example :<table><tr><th>Wind pollinated flowers</th><th>Insect Pollinated flowers</th></tr><tr><td>Maize, <i>Cannabis</i>, Grasses</td><td><i>Yucca</i>, Sunflower</td></tr><tr><td colspan="2">Any other correct example (Any one)</td></tr></table>	Wind pollinated flowers	Insect Pollinated flowers	Flowers are dull or not colourful	Flowers are colourful	Flowers do not produce nectar	Flowers produce nectar	Flowers are not fragrant	Flowers are fragrant	Flowers are generally of small size	Flowers are of large size	Pollen grains are produced in large numbers.	Pollen grains are not produced in large numbers	Pollen grains are light weight and non sticky.	Pollen grains are heavy and sticky	Often have feathery stigma to easily trap air borne pollens	Stigma is often non feathery	Any other correct difference (Any four)		Wind pollinated flowers	Insect Pollinated flowers	Maize, <i>Cannabis</i> , Grasses	<i>Yucca</i> , Sunflower	Any other correct example (Any one)		$\frac{1}{2} \times 4$ $\frac{1}{2} + \frac{1}{2}$	3
Wind pollinated flowers	Insect Pollinated flowers																										
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Any other correct example (Any one)																											
23.	- Stabilising – more individuals acquire the mean character value i.e variation is much reduced. Peak gets higher and narrower  - Directional – more individuals acquire value other than the mean character value.	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$																									

	- Disruptive – more individuals acquire peripheral character value at both ends of the distribution curve two peaks are formed. //	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2} \times 6$	3
24.	(a)	$\frac{1}{2} \times 4$	

	(b) The RNA transcribed is 5'A U G C A U G C A U A G 3' // (a)  (b) The RNA transcribed as 5 'G A U A C G U A C G U A 3'	1	
25.	(a) - Primary productivity- The amount of biomass or organic matter produced per unit area over a time period by the plants during photosynthesis. - It varies in different ecosystem depending upon– -The plant species inhabiting a particular area. -The environmental factors. - Photosynthetic capacity of plants - Availability of nutrients (Any two) (b) Herbivores are the primary consumers the rate of assimilation or formation of new organic matter at the consumer level is secondary productivity.	1 $\frac{1}{2}$ $\frac{1}{2}$ 1	3
26.	(a) Ex-situ conservation (b) -Cryopreservation – (–196⁰C) 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. (Any two)	$\frac{1}{2}$ 1+1	

	(c) Botanical Gardens , Wildlife safari parks (Any one)	$\frac{1}{2}$	3
27.	(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. (b) Steps to produce insulin through rDNA technology. - Eli Lilly an American Company prepared two DNA sequences corresponding to A and B chain of human insulin. - These chains A and B were then introduced in plasmid <i>E.coli</i> to produce multiple copies. - These chains were extracted of separately. - Chain A and B were combined by creating disulphide bonds to form human insulin.	1 $\frac{1}{2} \times 4$	3
28.	(a) -HIV attacks Macrophages first. -RNA genome starts producing viral DNA by reverse transcriptase. -The viral DNA gets incorporated into the DNA of host cell and directs the infected cells to produce viral particles. -The new viruses are released from the macrophages and they start infecting helper T lymphocytes (T_H). -Progressive decrease in helper T-lymphocytes takes place. -So the immune system of infected person becomes weak and start suffering from infections. //	$\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$ $\frac{1}{2}$	



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

$\frac{1}{2}$



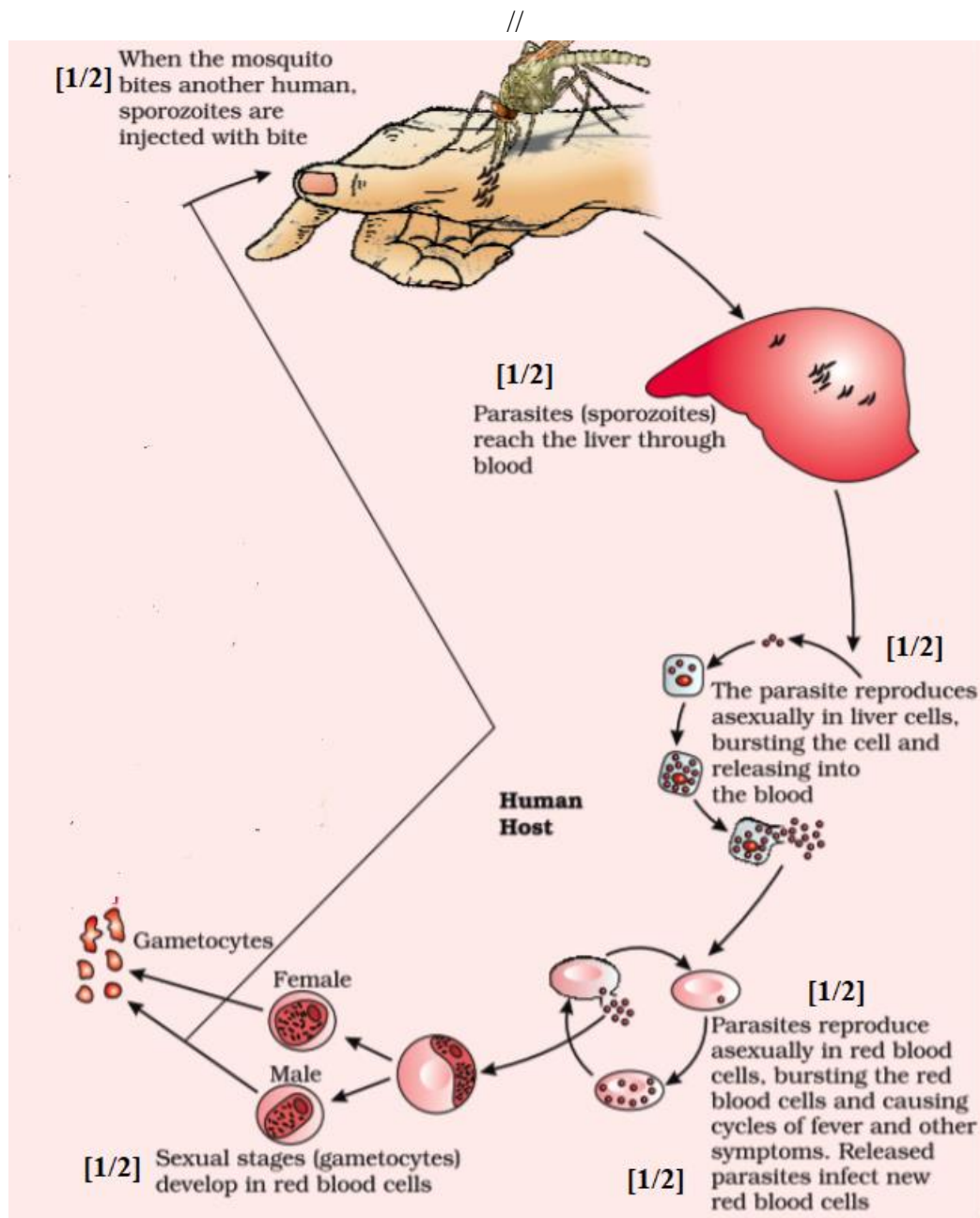
Rupture of RBCs and release of haemozoin

$\frac{1}{2}$



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.

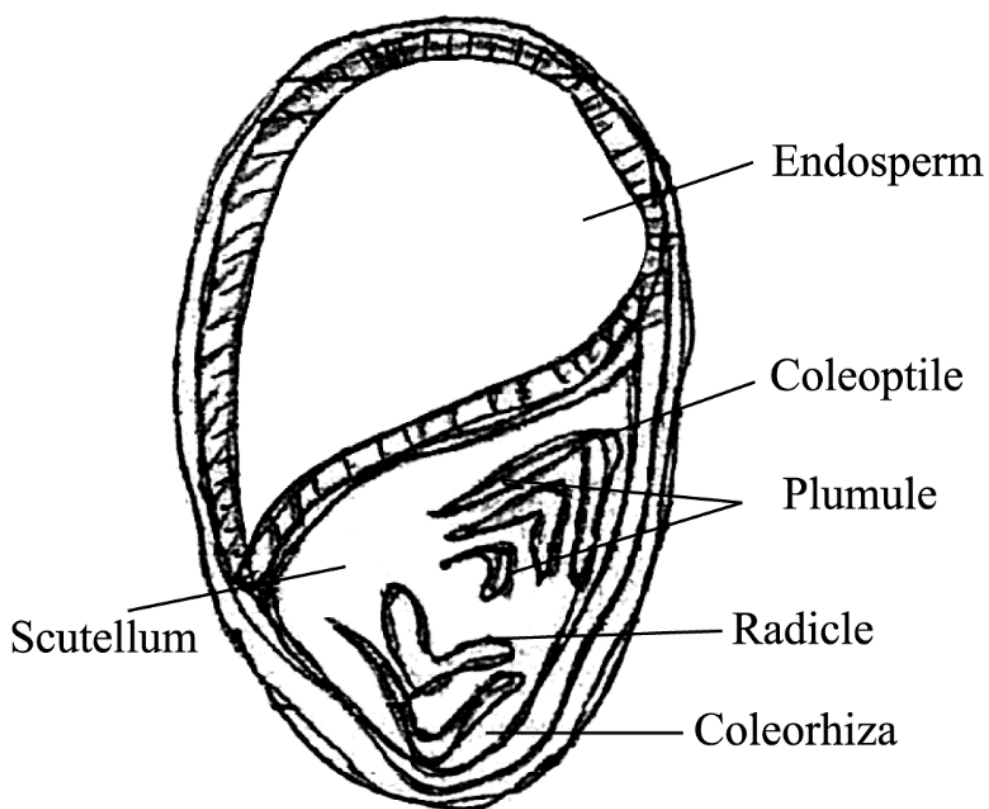
1

(c)

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

	(II) The restriction enzyme EcoRI recognised the palindromic sequence 5' – G↓AATTC – 3' 3' – CTAA↑G – 5' (a) (ii) • These overhanging stretches are called 'Sticky ends' • They form hydrogen bond with their complementary cut counterpart that facilitates the action of enzyme DNA ligase. OR (b) (i) - 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. - The presence of chromogenic substrate gives blue coloured colonies if the plasmid in the bacteria does not have insert or is non recombinant. - Colonies which do not produce any colour are identified as recombinants as their gene for enzyme is inactivated due to an insert. (ii) <i>Agrobacterium tumefaciens</i>. (iii) 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.	1 1 1 1 1 1 1	5
32.	(a) - 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. - FSH/ Follicle stimulating hormone , stimulate follicular development and secretion of estrogen by the follicle cells. - LH/ Luteinising hormone , stimulates ovulation/ formation of corpus luteum from the ruptured graafian follicle. - Progesterone , Maintenance of endometrium necessary for implantation and other events of pregnancy. - Estrogen , responsible for the maturation of primary follicle into graafian follicle/ regeneration of endometrium lining. OR	½+½ ½+½ ½+½ ½+½ ½+½	

(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.	(a) - Types and location of gene: –α- Thalassemia is under the control of two genes HBA1 and HBA2 , both located on chromosome-16. –β- Thalassemia is the control of a single gene HBB , present on chromosomes -11. - Causes: It is due to mutation / deletion of one or more of the four alleles of the genes controlling the disease. - Symptoms: Anaemia/ extreme tiredness / pale skin/ Breathlessness/ any other correct symptom <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 α and β chain are affected.</td><td>Only β chain is affected. (any one)</td></tr></table> OR (b) (i) Major goals of HGP: - Identify all the genes (20,000-25,000 in human DNA) - Determine the sequence of the three billion base pairs present in human DNA - Store the information in database. - Improve the tools for data analysis. - Transfer the technologies to other sectors (like industries). - Address the ethical legal and social issues(ELSI) that may arise from this project.	Thalassemia	Sickle cell anaemia	It is quantitative where less amount of haemoglobin is synthesised.	It is qualitative where defective haemoglobin is synthesised.	Both α and β chain are affected.	Only β chain is affected. (any one)	$\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ 1 1 1 $\frac{1}{2} \times 4$	
Thalassemia	Sickle cell anaemia								
It is quantitative where less amount of haemoglobin is synthesised.	It is qualitative where defective haemoglobin is synthesised.								
Both α and β chain are affected.	Only β chain is affected. (any one)								

	(any four) (ii) Methodologies : - Expressed Sequence Tags (ESTs) , It focuses on identifying all the genes that are expressed as RNAs. - 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. - (iii) • Yeast artificial chromosomes • It is used as vector.	$\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$ $\frac{1}{2}+\frac{1}{2}$	5
	- o O o -		