

99/1 local

- |    |  |                             |
|----|--|-----------------------------|
| 1  | Viable plate count   | 1                           |
| 2  | Monoclonal antibodies- OKT3 bind to receptors on T cells blocking their function and therefore prevent allograft rejection.                                | 1                           |
| 3  | Growth of ice crystals is retarded below -130°C and the cells are preserved.   | 1                           |
| 4  | Two properties which make viruses good vectors are :<br><br>Natural infectivity<br>Autonomous replication  | $\frac{1}{2} + \frac{1}{2}$ |
| 5  | (Any 1)Faster action (15 minutes for humulinvs 3 hrs. for pig insulin);<br>Non-allergic<br>Humulin / Recombinant insulin prevents slaughtering of animals. | 1                           |
| 6  | Protein sequences will have more than 4 different alphabets  | 1                           |
| 7  | (Any 4)<br><br>Maintenance of pH<br>Physiological conditions<br>Inhibitors of proteolytic enzyme<br>Avoidance of agitation<br>Minimum processing time      | $\frac{1}{2} \times 4 = 2$  |
| 8  | (Any two)<br><br>Removal of introns<br>Post transcriptional modifications<br>Post translational modifications<br>Proper folding of proteins                | 1+1= 2                      |
| 9  | Abnormal development of endosperm<br>Premature death of embryo   | 1+1=2                       |
| 10 | (Any two)<br><br>Somatic hybrids<br>Cybrids (Cytoplasmic hybrids)<br>Genetic transformation<br>Metabolic studies   | 1+1=2                       |
| 11 | CO <sub>2</sub> BODs provide (i) CO <sub>2</sub> level for maintenance of pH in animal culture medium  | 1+1=2                       |

(ii) High humidity

OR

Any two from page 137-138

1+1=2

12 
$$\mu = \frac{2.303 (\log X_t - \log X_0)}{t}$$

$$\mu = \frac{2.303 (\log 10^7 - \log 10^4)}{4}$$

$$(X_0 = 10^4, X_t = 10^7, t = 4 \text{ hours})$$

Solving the above equation, using the values

$$\mu = 1.73/\text{hr.}$$

1

$$t_d = \frac{0.693}{1.73} = 0.4 \text{ hrs.}$$

$$0.4 \times 60 = 24 \text{ min.}$$

1

OR

Use formula (Refer to page no 97)

$$n = 3.3 (\log 10^7 - \log 10^4)$$

$$\text{and } t_d = t/n$$

13 Recombinant proteins are expressed intracellularly and therefore require extensive processing (page 42)

Validation and quality assurance are costly (page 43)

1+1

14 Olive oil –antifoaming agent

Baffle flask - aeration

Urea - Nitrogen source

Agar – solidifying agent

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

15 (Any 2 with explanation)

2

Ionic bonds, hydrophobic interactions, hydrogen bonds, Vander Waal's interactions

Peptide bonds, Disulfide bonds.

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

16	Subtilisin digests protein stains.	1
	Wild type subtilisin has Met at position 222 which is inactivated by bleach in laundry detergent.	1
	Site directed mutagenesis is used to substitute Ala for Met and thereby stabilize enzyme.	1
17	Four features are: (1) Origin of Replication (2) Selectable markers (3) Cloning sites (MCS) (4) Small size (Improves transformation efficiency) Plasmids are versatile and easy to manipulate	$\frac{1}{2} \times 4$     1
18	Diagram as on page 3; Figure 1 Should include steps Isolation of DNA Insertion of restriction fragment into vector Transformation of host Selection and propagation of clone	    3
19	Chemicals required for basic metabolic processes (eg- sugars, lipids etc) are 'primary metabolites.  Additional products (eg- alkaloids) are secondary metabolites.	1  1
	Any 2 metabolites from Table 1 (Pg. 118)	$\frac{1}{2} + \frac{1}{2}$
20	Herbicide tolerance: overproduction of herbicide target enzymes by RDT/ introduction of herbicide resistant enzyme Insect resistance: Introduction of Bt or Cry genes Virus resistance: Introduction of viral coat protein genes	1 1 1

21	The ' <i>in silico</i> ' prediction methods for gene number are not accurate.	1
	Existence of overlapping genes/splice variants (alternate splicing of mRNA) (Page.61)	2
22	Introduction of fluorescent colors into chromosomes is done by using nick translation with fluorescent dNTP's, DNase I and DNA polymerase.	2
	Diagram as on page 65(Figure 2)	
	(Any 1) Abnormal karyotypes of CML patients(Figure 3)/microarray etc.	1
23	Pg.139	1
	Membrane integrity maintained	
	Helps to maintain the shape and size of cells.	1
	Salt, glucose and amino acids (any two) are the major ingredients that determine osmolality of the medium.	1
24	Monoclonal antibodies are epitope-specific antibodies.	1
	Production of monoclonal antibodies (Fig. 7; pg. 142).	2
25	Fig. 9/ pg. 100	$\frac{1}{2} \times 6$
	(Using any suitable example)	
26	SNP- Single nucleotide polymorphism	1
	(Any one)	
	Examples: ApoE gene linked to Alzheimer's disease.	2
	CCR5 gene linked to resistance to HIV (Page 63)	
	Genetic variations in the non-coding region are used in:	
	DNA fingerprinting	
	Population genetics	
	SNP analysis for predicting efficacy of a drug (Any 2)	2
	OR	
	<b>BLAST –Basic Local Alignment Search Tool</b>	1
	A given sequence is compared with sequences in the database	
	Top scoring matches are ranked according to criteria that serve to distinguish between a similarity due to ancestral relationship or due to random chance.	

	True matches are further examined thoroughly with other details accessible through Entrez and other tools available at NCBI	3
	Find homology/paralogy between gene sequences	1
27	Zymogens: Inactive form of an enzyme	1
	Correct folding of chymotrypsin brings Ser 195, His 57 and Asp102 in close proximity; Explain the charge relay system (Fig. 5/ pg. 35)	3
	Examples: Thrombin/trypsin/acetylcholine esterase etc. (Any 2)	$\frac{1}{2} \times 2$
OR		
	Peptide mapping (Fig. 6; page 37)	4
	The substitution of Glu by Val in the $\beta$ -chain changes the structure of Sickle cell Hb and it shows a tendency to form fibers within RBC resulting in sickling	1
28	Basic steps: Denaturation, annealing and extension (Fig. 8/Page. 17-18)	4
	It is used to detect pathogens by using pathogen specific primers	1