

### 99 Outside

- | 1.                               | Purity of the proteins during purification can be assessed by measuring specific activity.   | 1                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
|----------------------------------|--|----------------------------------|-------------------|-------------------|-------------|---------------------------|------------------------------|----------------------------|----------------------------------|----------------------------------|----------------------------------|---|
| 2                                | To search for novel products from microbial genomes in an environment.   | 1                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 3                                | Using M-13 phage as cloning vector which has a single strand DNA as genome.  | 1                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 4                                | The barnase/barstar system should be introduced into the mustard seeds.  | 1                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 5                                | (Any 1 reason)<br>Interferon is expressed intracellularly<br>No post translational modifications are possible for the eukaryotic protein in <i>E. coli</i> .   | 1                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 6                                | (Any 2 reasons)<br>Alternate splicing of genes<br>Overlapping genes<br>Post translational modification<br>RNA editing  | $\frac{1}{2} \times 2$           |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 7                                | pH maintenance required for optimal activity of enzymes and other biomolecules.<br>CO <sub>2</sub> - bicarbonate buffer system   | 1<br>1                           |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 8                                | Cost effective and easy availability of bulk media components required in large scale culturing.<br>Sources (Any two, Page. 86)  | 1<br>$\frac{1}{2} + \frac{1}{2}$ |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 9                                | Serum supplemented medium has no defined (known) composition and contains nutrients, hormones etc.   | 2                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 10                               | rHuEPO stimulates RBC production without the risks involved of blood transfusion such as transfusion related diseases like AIDS etc.   | 2                                |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| 11                               | Any two:<br><table style="width: 100%; margin-left: 40px; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%; text-align: center;"><b>Batch</b></th> <th style="width: 50%; text-align: center;"><b>Continuous</b></th> </tr> </thead> <tbody> <tr> <td>(a) Closed system</td> <td>Open system</td> </tr> <tr> <td>(b) Nutrients are limited</td> <td>Only one nutrient is limited</td> </tr> <tr> <td>(c) Normal growth kinetics</td> <td>Growth rate constant (log phase)</td> </tr> <tr> <td>(d) Used for laboratory purposes</td> <td>Used for commercial applications</td> </tr> </tbody> </table> | <b>Batch</b>                     | <b>Continuous</b> | (a) Closed system | Open system | (b) Nutrients are limited | Only one nutrient is limited | (c) Normal growth kinetics | Growth rate constant (log phase) | (d) Used for laboratory purposes | Used for commercial applications | 2 |
| <b>Batch</b>                     | <b>Continuous</b>  |                                  |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| (a) Closed system                | Open system  |                                  |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| (b) Nutrients are limited        | Only one nutrient is limited   |                                  |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| (c) Normal growth kinetics       | Growth rate constant (log phase)   |                                  |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |
| (d) Used for laboratory purposes | Used for commercial applications   |                                  |                   |                   |             |                           |                              |                            |                                  |                                  |                                  |   |

- 12 In animal cell cultures, cells are in the bottom of the container and hence can be visualized only by an inverted microscope 2
- 13 (Any 1)Karyotype analysis confirms: 1
- the species of origin
  - detects chromosomal abnormalities

(Any1)Stability affected by:

- cell line
  - growth conditions
  - frequency of subculturing
  - cells frozen or not
- 1

OR

Animal cells: Complex nutritional requirements and fragility of cells 1

Serum essential due to undefined nutritional and growth factor requirements 1

- 14 Interspecific crosses lead to abnormal endosperm development resulting in premature death. 1

Embryo should be excised and cultured. 1

- 15 Restriction Enzymes: Cut DNA specifically 1+1+1  
DNA ligase: Join different DNA fragments  
Alkaline phosphatase: Prevents self-ligation of the vector

- 16 Proteins are engineered by Site directed mutagenesis. 1

Technique applied to improve the stability of subtilisin/ properties of other proteins (Any 1) (Page. 52 onwards) 2

17

<b>Any 3 (Page.59)</b>		
<b>Structural Genomics</b>	<b>Functional genomics</b>	
(a) High throughput DNA sequencing	High throughput biological function of the genes	3
(b) Assembly and organization of sequences	Predicting interactions between genes and proteins	

	(c) High resolution genetic physical and transcript maps	Experimental methodologies with computational analysis	
	(d) 3-D structure of proteins	Biological functions of proteins	
18	Diagram and steps as on Page.120 Should include following steps: Identifying and cloning of gene of interest into Ti plasmid Transformation of <i>Agrobacterium</i> with recombinant plasmid Generation of transgenic plants and growth.		1+1+1
19	Antigenic proteins used as vaccines are expressed in edible plant parts such as banana, tomato etc.  (Any 2) Advantages: Painless delivery systems, cost effective, no storage problems etc.		1  1+1
20	Any six as listed on Pages 130-131		$\frac{1}{2} \times 6$
21	Expressing recombinant proteins in farm animal's milk on a commercial scale.  Four advantages as on page 39.		1  $\frac{1}{2} \times 4$
22	Schematic representation of FISH technique (as described on pages 65-66). Steps should include (Using the example of CML) a) Constructing fluorescent probes specific to chromosome 9 and chromosome 22 by using nick translation with DNase I, DNA polymerase I with red fluorescent dNTP's (for chromosome 9) and green fluorescent dNTP's (chromosome 22). b) Hybridising the green and red probes with the patients lymphocytes /chromosome smear c) Visualising hybridized regions with fluorescent microscope to detect translocations.		1  1 1
23	Screening transformed cells –Blue white selection method as described on page 17/GFP as described on page 15		3
24.	Due to any two : Alternate splicing, Overlapping genes , Post translational modifications and RNA editing  Any example from table on page 61 regarding lack of correlation a) Number of genes in human genome and worm are not very different.		2  1

	b)Number of genes in Arabidopsis more than complex human being.	
25	Diagram of Mass spectrometer as on page 45	2
	Protein sequences / Molecular mass can be determined.	1
26.	Principle: Chain termination using dd NTPs	1
	Diagram (figure 13),page 24	2
	Steps on page 23	2
27.	Two phases consisting of Dextran and PEG.	2
	Proteins will partition into PEG and cellular debris into dextran /diagram on page 42.	
	Precautions to maximize stability of proteins.	3
	Any three from page 43.	
	OR	
	Proteins with nutritional and medicinal value.	1
	Importance of curd in controlling intestinal infections and having beneficial bacteria for digestion	2
	Whey increases glutathione levels useful for detoxification of xenobiotics and to decrease the production of oxygen intermediates.	2
28.	SNP –Single Nucleotide Polymorphism.	1
	Variation at single nucleotides	
	Physicians use SNP maps to correlate SNPs with disease susceptibility as depicted on page 63	2
	Examples:	
	ApoE gene linked to Alzheimer’s disease.	2
	CCR5 gene linked to resistance to HIV (Page 63)	
	(Any one)	
	OR	
	Any four databases with information content as on page 80.	4
	Example of database retrieval tool (any one) and its application as on page 78 -79.	1