

## 1 Mark Questions

- Which of the following inhibitor uncouples electron transport and oxidative phosphorylation?
  - Azide
  - Dinitrophenol
  - Oligomycin
  - Rotenone
- The catalytic efficiency of an enzyme is represented by
  - $V_{max}$
  - $K_m$
  - $K_{cat}$
  - $K_{cat}/K_m$
- Which of the following activate protein kinase C?
  - Inositol 1, 4, 5-triphosphate
  - Cyclic AMP
  - Inositol
  - Diacylglycerol
- Transcription initiation sites can be determined by
  - footprinting
  - northern blotting
  - primer extension
  - nick translation
- One common feature between B and T-cells is that both
  - cells produce antibodies
  - cells possess MHC class II
  - B-cell receptor and T-cell receptor undergo rearrangement
  - cells can produce cytokines
- In hybridoma technology, the myeloma cells used lack
  - HGPRT ase
  - the ability to produce Ig
  - both HGPRT ase and ability to produce Ig
  - thymidine kinase

## 2 Marks Questions

- Match the function in group I with organelle in group II.

Group I	Group II
A. Protein synthesis	1. Endoplasmic reticulum
B. Protein degradation	2. Golgi body
C. Protein glycosylation	3. Lysosome
	4. Peroxisome

### Codes

A	B	C	A	B	C
(a) 3	2	1	(b) 1	3	2
(c) 1	4	3	(d) 4	1	2

- Match the polysaccharides in group I with their constituent monosaccharide in group II.

Group I	Group II
A. Chitin	1. D-glucose
B. Hemicellulose	2. N-acetyl glucosamine
C. Glycogen	3. D-Xylose
	4. D-Galactose

### Codes

A	B	C	A	B	C
(a) 1	3	4	(b) 2	4	1
(c) 4	2	3	(d) 2	3	1

- The  $T_m$  of phosphatidyl choline A is higher than  $T_m$  of phosphatidyl choline B because
  - A has shorter chain fatty acid and more unsaturated fatty acid than B
  - A has longer chain fatty acid and more saturated fatty acid than B
  - A has shorter chain fatty acid than B
  - A has more/cis unsaturated fatty acid than B
- A mixture of proteins namely P, Q, R and S having molecular mass 50, 80, 120 and 150 KDa is applied on the Sephadex-G200 column. The order of their elution will be
  - A, B, C, D
  - D, C, B, A
  - B, A, C, D
  - A, B, D, C

11. Match the transition state or chemical entity of each enzyme that is responsible for their catalytic function

Group I	Group II
A. Ribonuclease	1. Oxyanion
B. Lysozyme	2. Pentacovalent phosphorus
C. Chymotrypsin	3. Carbonium ion
D. Carboxypeptidase	4. Mixed anhydride

**Codes**

A	B	C	D	A	B	C	D
(a) 3	2	4	1	(b) 2	3	1	4
(c) 2	1	3	4	(d) 4	3	2	1

12. Match the function of the following cofactors.

Group I	Group II
A. Thiamine pyrophosphate	1. Acyl group transfer
B. Coenzyme-A	2. Transfer of one carbon component
C. Pyridoxal phosphate	3. Group transfer to/or from amino acid
D. Tetrahydrofolate	4. Aldehyde transfer

**Codes**

A	B	C	D	A	B	C	D
(a) 4	3	1	2	(b) 4	3	2	1
(c) 4	1	3	2	(d) 3	1	4	2

13. Match the enzymes in group I with their metabolic pathways in group II.

Group I	Group II
A. Succinyl Co-A synthetase	1. $\beta$ -Oxidation
B. Acyl Co-A dehydrogenase	2. Calvin cycle
C. Transketolase	3. Tricarboxylic acid cycle
D. Ribulose 1, 5-bisphosphate carboxylase	4. Pentose phosphate pathway

**Codes**

A	B	C	D	A	B	C	D
(a) 1	2	3	4	(b) 3	1	2	4
(c) 2	4	1	3	(d) 3	1	4	2

14. Glycolysis and gluconeogenesis are reciprocally coordinated. Which of the following will activate pyruvate carboxylase in gluconeogenesis?

- (a) Acetyl Co-A  
 (b) Fructose 2, 6-bisphosphate  
 (c) ADP  
 (d) ATP

15. The atoms of pyrimidine ring are derived from  
 A. Carbamoyl, B. Inosine monophosphate,  
 C. Aspartate, D. Glutamate.

- (a) A and B  
 (b) A and C  
 (c) A and D  
 (d) B and C

16. Which of the following statements are true for steroid hormones?

- A. Increase the enzymatic activity of pre-existing target enzyme.  
 B. Act at cell nucleus.  
 C. Interact with the plasma membrane receptors of target cell.  
 D. Form a complex with receptor and acts as transcriptional enhances.

- (a) A and C  
 (b) B and D  
 (c) A and B  
 (d) C and D

17. Match the items on the left with the inhibitors on the right.

Group I	Group II
A. DNA polymerase $\alpha$	1. Phenyl methyl sulphonyl fluoride (PMSF)
B. RNA polymerase II	2. Aphidicolin
C. Serine protease	3. $\alpha$ -amanitin
	4. Actinomycin

**Codes**

A	B	C	A	B	C
(a) 2	3	1	(b) 3	1	2
(c) 2	1	2	(d) 1	2	4

18. A nucleic acid sample is resistant to digestion with  $\lambda$  exonuclease. When heated it does not show typical melting curve of a linear double stranded DNA. On CsCl-ethidium bromide equilibrium density centrifugation it settles at the bottom of the centrifuge tube. The nucleic acid is

- (a) ccc pBR322  
 (b) Bacteriophage P22 DNA  
 (c) rRNA  
 (d) RFII M 13 DNA

19. The following four different solutions are prepared by mixing the components of electron transport chain. Which among them is expected to cause a net transfer of electrons to cytochrome-c?

- (a) Reduced ubiquinone and reduced cytochrome-c.
- (b) Reduced ubiquinone, cytochrome- $b-c_1$  complex and reduced cytochrome-c.
- (c) Oxidized ubiquinone and oxidized cytochrome-c.
- (d) Reduced ubiquinone, cytochrome- $b-c_1$  complex and oxidized cytochrome-c.

20. Nucleated cells tends to be more resistant to complement mediated lysis than RBC because

- (a) many nucleated cells can endocytose the membrane attack complex
- (b) membrane attack complex cannot get inserted in the nucleated cell membrane
- (c) membrane attack complex can get inactivated by the nucleated cells
- (d) membrane attack complex get inactivated hence, cannot get inserted in the nucleated cell membrane

21. In a fluorescein labelled antibody to  $\mu$  heavy chain and rhodamine labelled antibody to  $\delta$  heavy chain, the fluorescent antibody staining pattern of the progenitor B-cells (Pro-B-cells) will be

- (a) anti- $\mu$  staining in cytoplasm and on membrane
- (b) anti- $\mu$  and anti- $\delta$  staining in cytoplasm and on membrane
- (c) no cytoplasmic or membrane staining with either anti  $\mu$  or  $\delta$  antibody
- (d) anti- $\mu$  staining on the membrane

22. Serum IgM cannot activate the complement by itself because

- (a) it does not have complement binding site
- (b) it is planar in which complement binding sites in the  $F_c$  region are not accessible
- (c) it gets degraded and hence, unable to activate the complement
- (d) it needs metal ions to activate complement

#### Common Data for Questions 23 and 24

A *Caenorhabditis* contig for one region of chromosome 2 contains contiguous locations marked 1, 2, 3, 4, 5, 6, 7, 8 and 9. Cosmid clones a, b, c, d and e overlap the locations 2-4, 3-5, 4-6, 5-8, 8-9 respectively. A cloned pBR322-x hybridize to cosmids b, c and d and pUC18-y hybridize to cosmids d and e.

23. The approximate locations of x and y are

- (a) 4 and 7
- (b) 5 and 8
- (c) 4 and 8
- (d) 5 and 7

24. Both pBR322-x and pUC18-y will hybridize to cosmids

- (a) b
- (b) d
- (c) e
- (d) c

In animal cells concentration of sodium ions is higher outside the cell and less inside the cell, yet sodium does not enter the cells.

25. The cellular environment is maintained by generating a gradient and transporting the  $Na^+$  outside the cells through

- (a) diffusion process
- (b) passive transport via  $Na^+ - K^+$  pump
- (c) active transport via  $Na^+ - K^+$  pump
- (d) sodium ions not be transported

26. Digitoxigenin, a cardiotonic steroid that inhibits ATPase when applied on extra cellular face of membrane, helps in accumulation of  $Ca^{2+}$  inside the cardiac muscle cells by

- (a) activating  $Na^+ - K^+$  pump and blocking  $Na^+ - Ca^{2+}$  exchanger
- (b) inhibiting  $Na^+ - K^+$  pump and blocking  $Na^+ - Ca^{2+}$  exchanger
- (c) having no effect on  $Na^+ - K^+$  pump
- (d) increasing passive diffusion

#### Statement for Linked Answer Questions 27 and 28

Nearly 46% of 45 S pre rRNA is unstable. The remaining portion of it forms mature 5.8 S, 18 S and 28 S rRNA having lengths 160 bases, 1.9 kb and 5.1 kb respectively. The content of pre rRNA per human genome is  $78 \times 10^{15}$  g.

27. The mol.wt of 45 S pre-rRNA is

- (a)  $2 \times 10^6$
- (b)  $4.5 \times 10^5$
- (c)  $45 \times 10^6$
- (d)  $3.9 \times 10^7$

28. The number of pre-rRNA genes per genome is approximately

- (a) 10
- (b) 100
- (c) 1000
- (d) 10,000