

**BIOCHEMISTRY**

**(BIOT 2103)**

**Time Allotted : 3 hrs**

**Full Marks : 70**

*Figures out of the right margin indicate full marks.*

*Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.*

*Candidates are required to give answer in their own words as far as practicable.*

**Group - A**  
**(Multiple Choice Type Questions)**

1. Choose the correct alternative for the following: **10 × 1 = 10**

- (i) The cofactors of pyruvate dehydrogenase complex are:  
(a) Folate and TPP (b) FAD and NAD<sup>+</sup>  
(c) NADH and Nicotinic acid (d) all of these
- (ii) The regulation of glycolytic pathway involves:  
(a) Allosteric stimulation by ADP (b) Allosteric inhibition by ATP  
(c) Feed back inhibition by ATP (d) All of these
- (iii) Allosteric enzymes are  
(a) Larger than simple enzyme  
(b) Smaller than simple enzyme  
(c) Larger and more complex than simple enzyme  
(d) Smaller and less complex than simple enzymes
- (iv) The net gain of ATP molecules resulting from glycolysis is  
(a) 2 (b) 4  
(c) 38 (d) 32
- (v) The metabolite that finally enters TCA cycle is  
(a) Pyruvate (b) Ethanol  
(c) Acetyl CoA (d) Lactate
- (vi) The coenzyme involved in transfer of acetyl group  
(a) NADH (b) Coenzyme A  
(c) S-adenosyl methionine (d) Biotin

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- (vii) The two key enzymes of glyoxalate cycle are  
(a) Isocitrate lyase and isocitrate dehydrogenase  
(b)  $\alpha$  keto glutarate dehydrogenase and isocitrate dehydrogenase  
(c) Iso citrate lyase and malate dehydrogenase  
(d) Isocitrate lyase and malate synthase
- (viii) In the signal transduction mechanism known as protein phosphorylation  
(a) The signaling molecule binds to a surface receptor  
(b) Receptor kinases play a key role in triggering the signal cascade  
(c) Phosphorylated proteins act with enzymes to trigger the signal cascade  
(d) All of the above
- (ix) Aspartate is deaminated to produce  
(a) pyruvic acid (b) citric acid  
(c) oxalic acid (d) fumaric acid
- (x)  $\beta$ -oxidation takes place in:  
(a) Mitochondria (b) Cytoplasm  
(c) Chloroplast (d) Nucleus

### Group - B

2. (a) Discuss with a flow chart the preparatory phase of glycolysis. Why this is called a preparatory phase?  
(b) In the synthesis of glucose in liver, how this phase operates?  
(c) Write short notes on : Lock and key model for enzyme activity.  
 $(2 + 2) + 4 + 4 = 12$
3. (a) Draw the TCA cycle with structure of all intermediates mentioning all enzymes and cofactors.  
(b) Classify enzymes in six different categories with example.  
 $8 + 4 = 12$

### Group - C

4. (a) What are the functions of carrier proteins for hormones?  
(b) Outline the mechanism of action of hydrophilic hormones with receptors in target cells.  
(c) Using a flow-chart, explain how negative feedback mechanism regulates hormone secretion.  
 $4 + 4 + 4 = 12$
5. (a) How  $\alpha$ -oxidation of fatty acids occurs?

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- (b) Explain the process of Ketogenesis.
- (c) What are micronutrients? Describe what happens in presence of too much or too little of Vitamin D.

$$4 + 4 + (2 + 2) = 12$$

### Group - D

6. (a) Describe with a suitable example the transamination reaction. Discuss the role of vitamin B<sub>6</sub> in transamination.

- (b) Discuss the catabolism of any one glucogenic amino acid.

$$(4 + 3) + 5 = 12$$

7. (a) Describe the breakdown of purines.

- (b) Discuss the synthesis of: GABA and Dopamine.

$$6 + (3 + 3) = 12$$

### Group - E

8. (a) What is the major difference between primary and secondary messengers?

- (b) Describe the  $\beta$ -adrenergic pathway and how epinephrine is desensitized?

- (c) Discuss about ligand gated ion channels.

$$4 + 4 + 4 = 12$$

9. (a) Describe the different molecular mechanisms (characteristic) of ligand-receptor signalling.

- (b) Describe with the help of a diagram G-protein mediated signalling cascade.

- (c) Write down the JAK-STAT pathway with the help of a diagram.

$$4 + 4 + 4 = 12$$

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