

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (BT)/SEM-3/BT-301/2010-11**

**2010-11**

**CELL BIOLOGY & BIOCHEMISTRY**

Time Allotted : 3 Hours

Full Marks : 70

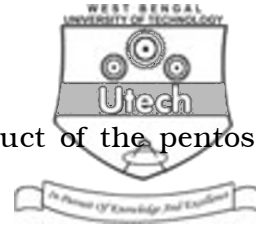
*The figures in the margin indicate full marks.*

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

**GROUP – A**

**( Multiple Choice Type Questions )**

1. Choose the correct alternatives for the following :  $10 \times 1 = 10$ 
  - i) The stage of the cell cycle where the cell is preparing to begin DNA replication is called
    - a) G1
    - b) G2
    - c) S
    - d) M.
  - ii) The activity of which of the following enzymes is not required for the release of large amount of glucose from liver glycogen ?
    - a) Glucose-6-phosphatase
    - b) Fructose-1, 6-bisphosphatase
    - c) Phosphoglucomutase
    - d) Debranching enzyme ( -1, 6-glucosidase )
    - e) Glycogen phosphorylase.



iii) Which of the following is not a product of the pentose phosphate pathway ?

- a) NADPH
- b) Glutathione
- c)  $\text{CO}_2$
- d) Ribulose 5-phosphate
- e) Sedoheptulose 7-phosphate.

iv) Hexokinase

- a) catalyzes the conversion of glucose-6-phosphate to fructose-1, 6-bisphosphate
- b) requires  $\text{Ca}^{2+}$  for activity
- c) uses inorganic phosphate to form glucose-6-phosphate
- d) transfers a phosphoryl group to a variety of hexoses
- e) is not found in muscle cells.

v) Which steps of  $\beta$  oxidation of fatty acids require CoA ?

- a) 1st and last steps
- b) last step
- c) not at all required
- d) 1st step.



vi) Treatment of a mitochondrial preparation with oligomycin inhibits oxidative phosphorylation. If the preparation is treated simultaneously with oligomycin and DNP which of the following will occur ?

- a) ATP synthesis
- b) Electron transport with oxygen consumption but no ATP synthesis
- c) No electron transport and no ATP synthesis
- d) None of these.

vii) Each cycle of  $\beta$ -oxidation produces

- a) 1 FAD, 1 NADH and 1 acetyl-CoA
- b) 1 FADH<sub>2</sub>, 1 NADH and 1 acetyl-CoA
- c) 1 FAD, 1 NAD and 2CO<sub>2</sub> molecules
- d) 1 FADH<sub>2</sub>, 1 NAD and 1 acetyl-CoA.

viii) Glyceraldehyde 3 phosphate dehydrogenase is inhibited by

- a) Magnesium
- b) Zinc
- c) Iodide
- d) Iodoacetate.



- ix) The proteins which complex with DNA producing the “beads on a string” or nucleosomes are called
- a) Kinases
  - b) Proteases
  - c) Histones
  - d) Spindle fibres.
- x) The ..... portion of the cell membrane functions as a barrier while the ..... portion determines specific functions including pumps, receptors, adhesion, etc.
- a) carbohydrate, nucleic acid
  - b) lipid, protein
  - c) lipid, carbohydrate
  - d) nucleic acid, lipid.

**GROUP - B**

**( Short Answer Type Questions )**

Answer any *three* of the following.  $3 \times 5 = 15$

2. State the function of Pyruvate dehydrogenase complex in the conversion of Pyruvate of Acetyl CoA.
3. Substrate cycle amplifies metabolic signal. Explain.



4. What are the main reactions involved in  $\alpha$  oxidation ?

Mention name of the enzymes with coenzymes & cofactors.

2 + 3

5. Discuss the interactions between NADPH and glutathione metabolism and the consequence of glucose-6-phosphate dehydrogenase deficiency.

6. What are glucogenic and ketogenic amino acids ? Give examples. Explain why plants have no need to produce urea and yet contain nearly all the enzymes of urea cycle. 2 + 3

**GROUP - C**

**( Long Answer Type Questions )**

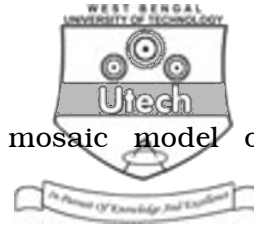
Answer any *three* of the following. 3 × 15 = 45

7. In the coordinated control of phosphofructokinase-1 ( PFK-1 ) and fructose-1, 6-bisphosphatase ( F-1, 6-bisPase ) identify the effects of AMP, citrate and fructose-2, 6-bisphosphate on the activities of the following enzymes.

a) Amytal

b) Arsenate.

9 + 6

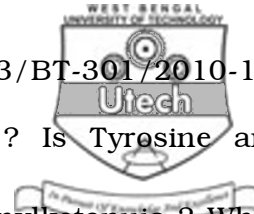


8. What are the main features of fluid mosaic model of membrane structures ? Write down the reaction catalyzed by phospholipase C. Briefly summarize the “second messenger” roles of the two products of the phospholipase C reaction. Describe the mode of action of cholera toxin creating diarrhoea ? Would an individual who has a congenital defect in enoyl CoA isomerase has more difficulty in metabolizing butter or olive oil ? Why ?

3 + 2 + 4 + 3 + 3

9. Describe the steps when palmitic acid is activated for beta oxidation ? Name the transport protein involved in fatty acid oxidation. Calculate the number of NADH and FADH produced during this complete oxidation. How phosphatidyl choline is synthesized ? State mode of cleavage of phosphatidyl choline by different phospholipases.

3 + 1 + 3 + 3 + 3 + 2



10. Phe is an essential amino acid. Why ? Is Tyrosine an essential amino acid in patients with Phenylketonuria ? Why

? How does  $\text{Na}^+ \text{K}^+$  ATPase pump work ? 1 + 2 + 6 + 6

11. What are the main three stages of Calvin cycle ? Describe the reactions converting 3-phosphoglycerate to hexose sugars.

Explain photorespiration with reactions. 3 + 7 + 5

=====