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5982

Your Roll No.

B.Sc. (Hons.) Bio-Chemistry / III Sem.

B

Paper: BCHT-305 : Metabolism of Carbohydrates and Lipids

Time : 3 hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all. Question No. 1 is compulsory.

1.(a) Explain the biochemistry of the following with examples:

- (i) Ketoacidosis, (ii) Anaplerotic reactions, (iii) Futile cycles, (iv) Substrate level phosphorylation, (v) Fermentation, (vi) Action of statins

(6 x 2 = 12)

(b) Explain the following:

- (i) Arachidonic acid is not an essential fatty acid.
- (ii) Phosphofructokinase rather than hexokinase is the main regulatory enzyme of glycolysis
- (iii) Mammals cannot convert fatty acids to glucose whereas plants can.

(2 + 2 + 3)

2.(a) Explain why

- (i) Fructose in adipose tissue is metabolized through fructose 6 phosphate but that in liver and muscle is not.
- (ii) Liver glycogen contributes to blood glucose but not muscle glycogen.
- (iii) Impairment of Pentose Phosphate Pathway leads to erythrocyte hemolysis

(3+3+3)

(b) Describe the 3 bypass reactions of gluconeogenesis.

(3)

(c) What is Pompe's disease and how is it caused?

(2)

Turn over

3.(a) What are the advantages of storing energy in the form of glycogen in the body? How is this glycogen mobilized under hypoglycemic conditions?

(6)

(b) With the help of reactions explain how galactose and mannose are funneled into the glycolytic pathway.

(4)

(c) B complex vitamins play a key role in the enzymology of the TCA cycle. Explain.

(4)

4.(a) Discuss the similarities between the Calvin cycle and Pentose Phosphate Pathway.

(5)

(b) Write the reactions for the following enzymes:

- (i) Glyceraldehyde 3 phosphate dehydrogenase.
- (ii) Citrate synthase
- (iii) Ribulose 1,5 bisphosphate carboxylase
- (iv) Pyruvate dehydrogenase

(2+2+2+3)

5.(a) What is a trifunctional protein? Describe its role in the oxidation of fatty acids.

(b) How is acetyl CoA that is produced in the mitochondria transferred to cytosol for fatty acid biosynthesis?

(c) Triacylglycerol synthesis in adipose tissue is dependent on glucose. Discuss.

(d) The liver cannot use ketone bodies both in fasting and well fed state. Why?

(e) The synthesis of TAG, phosphatidyl choline and phosphatidyl ethanolamine are dependent on the availability of free fatty acids. Why?

(3+4+3+2+2)

- 6.(a) Describe the complete oxidation of palmitate indicating the energy yield.
- (b) Unsaturated fatty acids require additional steps for degradation. Describe these steps.
- (c) How is cholesterol biosynthesis regulated in the body?

(7+3+4)

- 7.(a) The mammalian peroxisomal fatty acid oxidation pathway is similar to that in plant glyoxysomes. Compare.
- (b) What is the role of lipoprotein lipase? Why does this enzyme in the heart have a low K_m for TAG?
- (c) How are TAG digested and absorbed.

(5+4+5)

8. Write short notes.

- (a) Prostaglandins.
- (b) Starve feed cycle.
- (c) Photorespiration.

(4+4+6)