This question paper contains **4+1** printed pages]

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S. No. of Question Paper : **915**

Unique Paper Code : **249303** **G**

Name of the Paper : **BCHT-305/Metabolism of Carbohydrates and Lipids**

Name of the Course : **B.Sc. (Hons.)/Biochemistry**

Semester : **III**

Duration : **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.

Use of scientific calculator/log tables may be allowed.

1. (A) Explain any *seven* of the following observations : 7×2

(*a*) An individual with a congenital defect in enoyl CoA isomerase has more difficulty in metabolizing olive oil than butter.

(*b*) Glucose rather than glucose-6-phosphate is injected intravenously.

(*c*) Phosphofructokinase (PFK-I) catalysed step (step III) is the committed step of glycolysis.

P.T.O.

(*d*) Ketone bodies cannot be utilized as a source of energy by the liver.

(*e*) Water is excluded from the active site of hexokinase.

(*f*) Oxidation of odd chain fatty acids is gluconeogenic.

(*g*) Pyruvate carboxylase is activated by acetyl CoA.

(*h*) C^{14} labeled CO_2 is not incorporated into fatty acids.

(*i*) Generally there are separate pathways for anabolism and catabolism.

(B) Indicate the coenzyme(s) required for the following enzymes : 5×1

(*a*) Glycogen phosphorylase

(*b*) Transketolase

(*c*) Glucose-6-phosphate dehydrogenase

(*d*) Methyl malonyl CoA mutase.

(*e*) Acetyl CoA carboxylase.

2. Compare the following pairs : 4,3,3,4

(*i*) Fatty acid oxidation and synthesis.

(*ii*) Oxidative and reductive pentose pathway.

(*iii*) Malate aspartate and glycerol phosphate shuttle.

(*iv*) Glycolysis and gluconeogenesis.

3. Write short notes on : 4,5,5

(*i*) Cori cycle

(*ii*) Glycogen storage diseases

(*iii*) Photorespiration.

4. (A) Name the allosteric modulator(s) for each of the enzymes listed below : 4

(*i*) Citrate synthase

(*ii*) Carnitine palmitoyl CoA transferase I

(*iii*) Pyruvate kinase

(*iv*) Pyruvate dehydrogenase complex

(B) Adipose cells constantly breakdown and resynthesise triglycerides but synthesis cannot proceed without an external supply of glucose, why ? 3

(C) Explain : 7

(*i*) The activation of fatty acids.

(*ii*) Role of Carnitine in fatty acid metabolism

(*iii*) The oxidation of linoleic acid to acetyl CoA.

5. (A) Indicate the mode of action of the following inhibitors : 4

(*i*) Arsenate

(*ii*) 2-carboxy arabinitol-1 phosphate

(*iii*) Lovastatin

(*iv*) Fluoroacetate.

(B) How is glycogen synthesized in the liver ? Highlight the key aspects in the reciprocal regulation of glycogen synthesis and degradation. 10

6. (A) Give *one* significant contribution of the following investigators : 4

(*i*) Luis Leloir

(*ii*) Konrad Bloch

(*iii*) Hans Krebs

(*iv*) Melvin Calvin, A. Benson and J.A. Bassham.

(B) How does mannose and galactose enter the glycolytic cycle ? 5

(C) Give the primary cause and deficiency symptoms associated with any *two* lipid storage diseases. 5

7. (A) Glucose labeled with C^{14} at C–6 is added to a solution containing the enzymes and cofactors of the oxidative branch of the pentose phosphate pathway. Trace the fate of the radioactive label ? 3

(B) How do plants and bacteria convert acetyl CoA to glucose ? How does this route differ from the citric acid cycle ? 6

(C) Describe the biosynthesis of sphingomyelin from palmitoyl CoA and serine. 5

8. (A) Explain why ? 915

3×2

(*i*) Arachidonic acid is not an essential fatty acid in animals.

(*ii*) Skeletal muscle has no role in maintaining blood glucose levels although they do store excess glucose as glycogen.

(*iii*) Plant chloroplasts express very high levels of RUBISCO.

(B) Explain the following terms :

4×2

(*i*) Lactose intolerance

(*ii*) Anaplerotic reactions

(*iii*) Pasteur effect

(*iv*) Ketone bodies.

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