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This question paper contains 4 printed pages]

8/12/17

Roll No.

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S. No. of Question Paper : 6423

Unique Paper Code : 32491301

HC

Name of the Paper : Metabolism of Carbohydrates and
Lipids

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

Semester : III

Duration : 3 Hours

Maximum Marks : 75

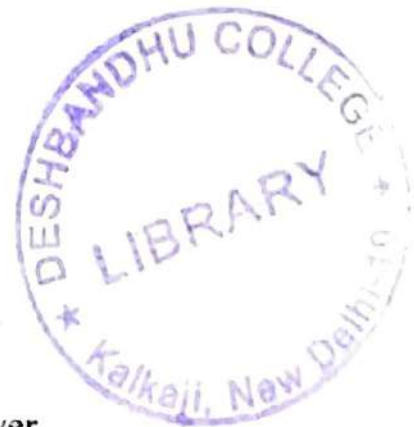
(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt five questions in all.

Question No. 1 is compulsory.

1. (a) Justify the following statements :

- (i) HDL delivers cholesterol to the liver.
- (ii) Intermediates of glycolysis are not able to leave the cells in which they are formed.
- (iii) Ketone bodies synthesis increases in uncontrolled diabetes.



- (iv) Possible hemolysis is observed in Glucose-6-phosphate dehydrogenase deficient persons.
 - (v) Glucokinase is an inducible enzyme.
 - (vi) A liver homogenate can't oxidize fatty acids unless some ATP is present.
 - (vii) Glycogenin is the primer involved in glycogen synthesis.
 - (viii) Branched chain fatty acids undergo α oxidation.
- (b) Name the following :
- (i) Regulatory enzyme of prostaglandins synthesis.
 - (ii) The first committed regulatory enzyme in glycolysis.
 - (iii) Amino acid required for the synthesis of ceramide.

16,3

2. Differentiate between the following :

- (i) Fatty acid oxidation in mitochondria and peroxisome
- (ii) Glyoxylate cycle and TCA cycle
- (iii) C_3 and C_4 plants.

5,5,4

3. (a) Explain how is RUBISCO enzyme regulated ?
- (b) Write down the following conversions :
- (i) Acetyl CoA to Mevolanate
 - (ii) Glucose-6-phosphate to Ribulose-5-Phosphate
 - (iii) Dihydroxy acetone phosphate to Plasmalogen. 5,9
4. Answer the following :
- (i) Why liver glycogen and not muscle glycogen contributes to blood glucose ?
 - (ii) How are fatty acids transported to mitochondria ?
 - (iii) How is acetyl CoA transported from cytosol to mitochondria ? 4,5,5
5. (a) How are glycogen synthesis and breakdown regulated reciprocally ?
- (b) Give the biochemical reasons of the following diseases :
- (i) Von Gierkés
 - (ii) Tay-Sachs
 - (iii) Galactosemia.
- (c) How does fructose get catabolized in liver and muscle ?

6. (a) Discuss the process by which a saturated fatty acid is converted to an unsaturated fatty acid.
- (b) Explain regulation of fatty acid biosynthesis.
- (c) Describe substrate level phosphorylation with an example. How is it different from oxidative phosphorylation? 5,4,5
7. (a) TCA cycle provides substrate for several biosynthetic processes. Justify.
- (b) How are ketone bodies catabolized?
- (c) Explain the reactions of pentose phosphate pathway when NADPH is not required. 5,5,4
8. Write short notes on :
- (i) CAM plants
- (ii) Malate aspartate shuttle
- (iii) Starve feed cycle. 4,5,5

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13/12/17

Roll No.

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S. No. of Question Paper : 6424

Unique Paper Code : 32491302 HC

Name of the Paper : Membrane Biology and Bioenergetics

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

Semester : III

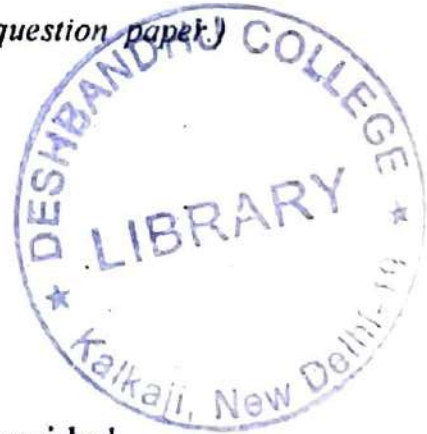
Duration : 3 Hours

Maximum Marks : 75

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

Attempt *five* questions in all,

including Question No. 1 is compulsory.



Log tables and/or scientific calculators may be provided.

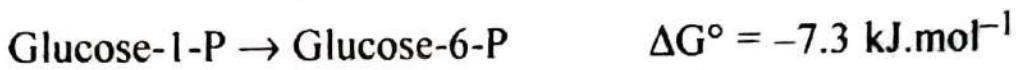
1. (A) Give explanation for the following :

(a) Phosphatidylserine is found predominantly on the cytosolic side of the bilayer.

P.T.O.

- (b) Cholesterol and sphingolipids associate in membrane to form lipid rafts.
 - (c) Vanadate is an inhibitor of $\text{Na}^+ \text{K}^+ \text{ATPase}$.
 - (d) Succinate restores O_2 consumption in rotenone blocked electron transport chain.
 - (e) Integral membrane proteins require detergents for their solubilization.
 - (f) When energy charge is low, the cell is in catabolic mode.
 - (g) Lipids with critical packing parameter < 1 do not form stable bilayers.
 - (h) DCMU is a potent herbicide.
- (B) Give the basis of the following diseases :
- (a) Cystic fibrosis
 - (b) Diabetes insipidus.

2. (A) For a reaction : $A \rightarrow B$, ΔH is 10 kJ.mol^{-1} , ΔS is $25 \text{ JK}^{-1}.\text{mol}^{-1}$. Under what conditions the reaction is spontaneous ?
- (B) Phosphoenolpyruvate has very high standard energy of hydrolysis. Why ?
- (C) Consider the sequential reaction :



- (i) What is the net reaction ? What is the ΔG° of the net reaction ?

- (ii) Calculate K'_{eq} of the coupled reaction.

- (D) Differentiate between NAD and FAD as electron carriers. 3,3,4,4

3. (A) State the chemiosmotic theory. Give experimental proof in support of the theory.

- (B) State whether creatine kinase will operate in the direction of ATP synthesis or phosphocreatine synthesis at 25°C when $[ATP] = 4 \text{ mM}$, $[ADP] = 0.15 \text{ mM}$, $[\text{phosphocreatine}] = 2.5 \text{ mM}$, and $[\text{creatine}] = 1 \text{ mM}$.
- (C) Give the detailed mechanism of ATP synthesis by F_0F_1 ATP synthase. 5,4,5

4. Explain the mechanism of the following processes :

- (a) Generation of proton gradient by complex III of ETC, transporting electrons from Ubiquinone to cytochrome C.
- (b) Transport of reducing equivalents by malate aspartate shuttle.
- (c) Phosphotransferase system.
- (d) The antioxidant mechanism in mitochondria to scavenge Reactive oxygen species. 4,4,3,3

5. Show how ?

- (a) Frye and Edidin's cell fusion experiment and Moor and Mühlethaller's freeze fracture technique formed the basis of Singer and Nicolson's fluid mosaic model.

- (b) RBC membrane skeletal protein spectrin forms a mesh like pattern restricting lateral diffusion of membrane components.
- (c) Tight junctions demarcate apical and basolateral regions of a polarized intestinal epithelial cell membrane.
- (d) FRAP technique is used in the study of membrane dynamics. 6,3,3,2

6. Give the functional role of the following :

- (a) Phycobilisomes in red algae.
- (b) Anion exchanger in RBC membranes.
- (c) Bacteriorhodopsin in *Halobacterium Halobium*.
- (d) Caveolae in membranes.
- (e) Brown adipose tissue in new born infant.
- (f) V type H^+ ATPases in osteoclasts. 2.5×4, 2×2

7. (A) Detail out the Z-scheme of photosynthesis in plant chloroplast. Also give the net light reaction of photosynthesis.
- (B) Show how the photosystem of green sulfur bacteria is a prototype of PSI in plant chloroplast.
- (C) Give the significance of segregation of PSII and PSI in grana and stroma lamellae respectively. 5,5,4
8. Give the mechanism of the following :
- (a) Voltage sensing by voltage gated Na^+ channel.
- (b) Clathrin mediated endocytosis.
- (c) Membrane fusion.
- (d) Liposomes as a drug delivery system.
- (e) Dissipation of ionic gradient by valinomycin. 3×4, 2

$$[R = 8.314 \text{ J/mol.K, } F = 96,480 \text{ J/V.mol}]$$

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18/12/17

Roll No.

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S. No. of Question Paper : 6425

Unique Paper Code : 32491303

HC

Name of the Paper : Hormone Biochemistry and Function

Name of the Course : B.Sc. (H) 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.

I. (A) Define the following terms : 1.5×6=9

- (i) Polyuria
- (ii) Endocrine Response
- (iii) Receptor Desensitization
- (iv) Negative Feedback
- (v) Hypophosphatemia
- (vi) LH surge.



(B) Comment on the following statements : 5×2=10

- (i) Goitre is seen in both hyper and hypothyroidism
- (ii) Breast feeding acts as a natural contraceptive

P.T.O.

- (iii) Acromegaly is seen only in adults
- (iv) Pregnant women show hyperpigmentation
- (v) Hyperglycemia is not confirmatory of Diabetes mellitus

2. Diagrammatically outline the following : 5,5,4
- (a) Blood pressure regulation by Renin Angiotensin System
 - (b) Synthesis of thyroid hormone
 - (c) Mechanism of action of steroid hormones
3. (a) What are somatomedians ? What is their role in bone growth ?
- (b) Obese people are more prone to NIDDM. Explain.
- (c) What is receptor crosstalk ? Illustrate with *one* example. 5,5,4
4. (a) Give the full forms for the following and explain their significance : 1.5×6=9
- (i) RxR
 - (ii) NGF
 - (iii) MAO
 - (iv) TRH
 - (v) ANF
 - (vi) PH domain.

(b) Outline the hormonal changes that occur during gestation and parturition. 5

5. Compare and contrast : 4,3,3,2,2

(a) Adenohypophysis and Neurohypophysis

(b) Osteomalacia and Osteoporosis

(c) Oxytocin and prolactin

(d) Neuroendocrine and paracrine response

(e) PKA and PKC.

6. Give the location and significance of the following cells of the endocrine glands : 2×7=14

(a) Beta cells of Islet of Langerhans

(b) Sertoli cells

(c) Chromaffin cells

(d) S cells of Gastrointestinal Tract

(e) Thecal Cells of the Ovary

(f) Zona Reticularis

(g) Supra optic Nuclei.

7. Differentiate the following : 4×3.5

(a) Cushing's Disease and Addison's disease

(b) Diabetes Insipidus and Diabetes Mellitus

- (c) Rickets and Osteomalacia
- (d) Graves Disease and Hashimotos Disease.

8. Write short notes on the following : 3.5×4=14

- (a) Adipose tissue as an endocrine gland
- (b) Gastric hormones
- (c) Stress response
- (d) Calcium homeostasis.

[This question paper contains 4 printed pages.]

2017

Your Roll No.....

Sr. No. of Question Paper : 5519

H

Unique Paper Code : 216/223/381

Name of the Paper : Cell Biology – I (CBHT-301)

Name of the Course : B.Sc. (Honours)

Semester : III

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **FIVE** questions in all.
3. Question No. 1 is compulsory.

1. (a) Differentiate between the following :

- (i) Hetrochromatin and Euchromatin
- (ii) Trans face and cis face
- (iii) Active and Passive transport
- (iv) RER and SER
- (v) Strach and Glycogen



P.T.O.

(b) Defines the following : (5)

- (i) Cotranslational translocation
- (ii) Intron
- (iii) Glycosylation
- (iv) Tight junction
- (v) Microfilament

(c) Write on the significance of the following : (6)

- (i) Prions
- (ii) Urate oxidase
- (iii) Gram staining
- (iv) Glucose-6-phosphatase
- (v) Lamin
- (vi) Mannose-6-phosphate

(d) Expand the following : (3)

- (i) NPC
- (ii) TOM
- (iii) NADH

- (e) Mention the contribution of the following : (3)
- (i) F. Sanger
 - (ii) Hartwell
 - (iii) Christian de Duve
2. Define the resolution of a microscope. What are the factors decide the resolving power of a microscope. Compare the functional principle of the electron microscope and light microscope. (12)
3. (a) Describe the process of r-RNA biogenesis. (6)
- (b) Write briefly about the Nucleosome model. (6)
4. (a) Why Mitochondria and chloroplast are considered semi autonomous organelles. (6)
- (b) Write briefly the principle of Spectrophotometry. (6)
5. (a) Describe the mechanisms by which protein is imported into mitochondrial membranes and matrix. (8)
- (b) Write about the Nuclar pore complex and its function. (4)

6. Compare differential centrifugation technique with Density gradient centrifugation for cell fractionation. (12)
7. Write short notes on **three** the following : (4×3)
- (a) Phase Contrast microscopy
 - (b) Golgi complex
 - (c) Microtubule associated proteins
 - (d) Glycosylation in RER
 - (e) Peroxysome

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[This question paper contains 4 printed pages.]

Your Roll No. 7/12/17

Sr. No. of Question Paper : 5547 **H**
Unique Paper Code : 249303
Name of the Paper : Metabolism of Carbohydrates and Lipids
Name of the Course : B.Sc. (Hons) Biochemistry
Semester : III
Duration : 3 Hours **Maximum Marks : 75**

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt five questions in all.
3. Question No. 1 is compulsory.



1. (a) Explain the following statements :

- (i) Glucose is immediately phosphorylated in the cell.
- (ii) Lactate accumulation takes place in muscles during strenuous exercise.
- (iii) HMP pathway is essential for nucleotide biosynthesis.

P.T.O.

- (iv) Gluconeogenesis does not occur in adipocytes.
- (v) Muscle glycogen does not contribute to blood glucose.
- (vi) We need to supplement our diet with essential fatty acids.
- (vii) Ketone bodies are not utilized in liver.
- (viii) TAG hydrolysis is increased in adipose tissue during fasting state.

(b) Give the contributions of the following scientists :

- (i) Hans Krebs
- (ii) Cori
- (iii) M. Calvin (16+3)

2. (a) Describe the malate aspartate shuttle.

(b) Explain the amphibolic role of the TCA cycle.

(c) Write the β -oxidation of palmitic acid in the mitochondria. (4,5,5)

3. Write the reactions and regulations of the following enzymes :

- (i) Pyruvate dehydrogenase complex
- (ii) Fatty acid synthase complex
- (iii) RUBISCO (5,5,4)

4. Differentiate between :
- (i) C_3 and C_4 plants
 - (ii) Hexokinase and glucokinase
 - (iii) Glyoxalate and TCA cycle
 - (iv) Oxidative Phosphorylation and substrate level phosphorylation (4,4,4,2)
5. (a) Describe the different classes of lipoproteins and their functions.
- (b) Enumerate the steps involved in the non-oxidative phase of HMP pathway.
- (c) How are fatty acids transported from cytosol to mitochondria for β oxidation? (5,5,4)
6. (a) How are ketone bodies synthesised in the liver? What is their physiological significance?
- (b) Explain how calvin cycle is a light dependent process.
- (c) When gluconeogenesis is on, glycolysis is off. Justify. (5,4,5)
7. (a) Write down the reactions affected by the following inhibitors/drugs :
- (i) Arsenate

(ii) Flouride

(iii) Aspirin

(iv) Iodoacetate

(b) Describe the hormonal regulation of blood glucose level.

(c) Name the enzymes responsible for the following disorders:

(i) Me Cardie disease

(ii) Pompe's disease

(iii) Refsum disease

(iv) Gaucher disease

(v) Von Gierke disease (4,5,5)

8. Write short notes on :

(i) Regulation of cholesterol biosynthesis

(ii) Glycogenolysis

(iii) Fermentation

(iv) Cellulose biosynthesis (3.5×4)