



12

03/12/2018

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 20 I
Unique Paper Code : 32491301
Name of the Paper : Metabolism of Carbohydrate and Lipids
Name of the Course : B.Sc. (H) 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 including Question No. 1 is compulsory.
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1. (a) Justify the following statements :
 - (i) HDL delivers Cholesterol to the Liver.
 - (ii) Intermediates of Glycolysis are not able to leave the cells.
 - (iii) Patients have fruity breath in uncontrolled diabetes mellitus.
 - (iv) Glucose-6-phosphate dehydrogenase deficient persons show resistance to malarial parasite.

P.T.O.

- (v) Fatty acids cannot enter the mitochondria on their own.
- (vi) Glycogenin is the primer involved in Glycogen synthesis.
- (vii) Fatty acid synthesis requires a three carbon intermediate.
- (viii) Thiamine deficiency leads to accumulation of Pyruvate.

(b) Mention the contribution of the following scientists :

- (i) Cori and Cori
- (ii) Franz Knoop
- (iii) Hans Krebs (16,3)

2. Differentiate between the following :

- (i) Fatty acid oxidation in Mitochondria and Peroxisomes
- (ii) Hexokinase and Glucokinase
- (iii) Glycogen synthesis and Glycogen breakdown (5,4,5)

3. Give reactions for the following and calculate the number of ATP needed / generated.

- (i) Acetyl CoA to Palmitic acid
- (ii) α -Ketoglutarate to Malate
- (iii) Oxaloacetate to Glucose (5,4,5)

4. (a) Discuss the fate of Glucose-6-Phosphate when the cell requires both NADPH and Ribose-5-Phosphate.
- (b) Write the reactions for the following :
- (i) Synthesis of Ceramide
 - (ii) Synthesis of Phosphatidyl ethanolamine and Phosphatidyl choline in mammals
 - (iii) Synthesis of Sucrose (5,9)
5. (a) What is the importance of Glyoxalate cycle in plants? Give the reactions of this cycle which are different from TCA.
- (b) Diagrammatically represent the Malate Aspartate shuttle. Give its advantage over the Glycerol-3-phosphate dehydrogenase shuttle.
- (c) Indicate the site of action of the following :
- (i) Aspirin
 - (ii) Fluoroacetate
 - (iii) Statin
 - (iv) Arsenate (5,5,4)
6. (a) Match the allosteric effectors in column A with enzyme in column B Also indicate the effect (positive or negative) :

Column A	Column B
(i) Fructose 1, 6 bisphosphate	Acetyl CoA carboxylase
(ii) Citrate	Glycogen Synthase
(iii) Glucose-6-Phosphate	Pyruvate Kinase
(iv) Palmityl CoA	Carnitine acyl transferase I
(v) Malonyl CoA	Pyruvate Carboxylase
(vi) Acetyl CoA	Phosphofructokinase

(6×1.5)

(b) How is Acetyl Co-A transported from Mitochondria to cytosol for fatty acid biosynthesis? (5)

7. Answer the following :

- (i) How does Fructose enter the glycolytic pathway in hepatic and non-hepatic tissues?
- (ii) Discuss the amphibolic nature of TCA cycle.
- (iii) How are ketone bodies synthesized? (4,5,5)

8. Write short note on the following (any 4) :

- (i) Regulation of Calvin cycle
- (ii) Starve feed cycle
- (iii) Lipoproteins
- (iv) RUBISCO
- (v) C4 plants

(3.5×4)

(300)

(13)

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Your Roll No.....

Sr. No. of Question Paper : 21 I

Unique Paper Code : 32491302

Name of the Paper : Membrane Biology and Bioenergetics

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, including Q. No. 1 which is compulsory.
3. Use of scientific calculator/log tables may be allowed.

1. (a) Explain the following :

(i) Di-nitrophenol acts as an uncoupler of oxidative phosphorylation.

(ii) Non-ionic detergents are preferred over ionic detergents for solubilisation of membrane proteins.

P.T.O.



- (iii) Energy charge is buffered.
- (iv) Accessory pigments funnel light energy to reaction centre.
- (v) A reaction with a positive ΔE can proceed in the forward direction.
- (vi) Cholesterol plays a dual role in maintaining fluidity of membranes.
- (vii) Plasma membrane is asymmetric in nature.

(7×2=14)

(b) Name the following :

- (i) A technique to demonstrate flip-flop movement of lipids in membrane
- (ii) A mobile electron carrier in electron transport chain
- (iii) Active transporter of calcium ions in membrane of Sarcoplasmic reticulum
- (iv) Photon dependent ion transporter in prokaryotes
- (v) Inhibitor of photophosphorylation used as herbicide

(5×1)

2. (a) Give schematic representation of path of electron flow :
- (i) Through Cytochrome bc₁ complex and Q cycle
 - (ii) Cyclic flow of electrons in Purple bacteria
 - (iii) Through Photo system-II (3×4)
- (b) Porins act as molecular sieve. Explain. (2)
3. (a) Justify the following statements :
- (i) Tight junctions maintain polarity in polarised cells.
 - (ii) There is no evolution of oxygen in cyclic photophosphorylation.
 - (iii) Electrical gradient is dissipated across thylakoid membranes of chloroplasts. (3×3)
- (b) Explain the binding change model for ATP synthesis. (5)
4. (a) How do Cyanobacteria and red algae harvest light energy?
- (b) When do the production of superoxide radicals increase in mitochondria? What are mitochondrial defence mechanisms against it?

(c) How is ATP hydrolysis prevented during hypoxia?

(5,5,4)

5. (a) Comment on the following :

(i) Anion porter system for bicarbonate-chloride is electrically neutral.

(ii) *Halobacterium halobium* survive in very high salt concentrations.

(iii) On addition of succinate, reduction of O_2 occurs even in the presence of rotenone and amytal.

(3×3)

(b) What is chemiosmotic theory? Discuss an experimental evidence in support of it.

(5)

6. (a) Write short note on the following :

(i) FRAP technique

(ii) Caveolae

(iii) Thermogenesis

(iv) Phosphorylation potential

(4×3)

(b) What is the role of V-Type ATPase? Where are they present? (2)

7. (a) Give contribution of the following scientists :

(i) Paul Boyer

(ii) John E Walker

(iii) Efrain Racker

(iv) Gortel and Gendel (4×3)

(b) Name the two integral proteins which enrich the lipid rafts. (2)

8. (a) Calculate the free energy change for transporting 1 mole of Na^+ out of the cell into the blood at 37°C . Given that the concentration of Na^+ inside the cell is 12 mM and that in blood plasma is 145 mM. The transmembrane potential of a typical animal cell is -0.07V (inside negative).

(b) Explain the mechanism of specific fusion of two membranes.

- (c) Explain the factors which contribute to large, negative, standard free energy of hydrolysis. Which is the highest energy intermediate? Justify. (5,5,4)

(14)

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S. No. of Question Paper : 22

Unique Paper Code : 32491303

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Name of the Paper : Hormone : Biochemistry and Function

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 which is compulsory.

1. (A) Explain the following terms :

(a) Hormone response elements

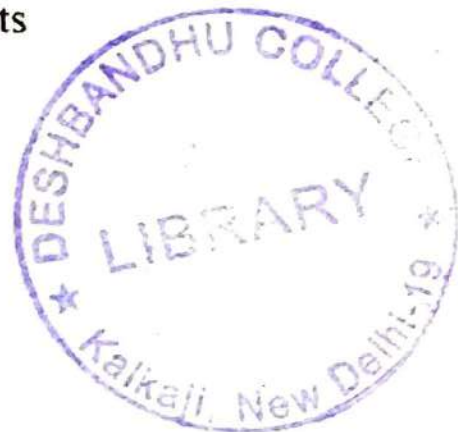
(b) SH2 domains

(c) Paracrine hormones

(d) G proteins

(e) PH domain

(f) Hormone therapy



1.5×6

P.T.O.

(b) Give explanation for the following :

(a) Ghrelin is a hunger hormone.

(b) Glucose when taken orally stimulates higher insulin release as compared to when taken intravenously.

(c) Polydipsia is observed in Diabetes insipidus.

(d) Vitamin D is a sunshine hormone.

(e) Dogs lick their wounds to facilitate healing. 2×5

2. Give a diagrammatic representation of the following :

(a) Activation of PKA by activated GPCR.

(b) Gene regulation by steroid hormone.

(c) Activation of Ras protein by EGF.

(d) Activation of STAT proteins by JAK kinases. 3.5×4

3. Give the detailed mechanism of the following :

(a) Thyroid hormone synthesis.

(b) Regulation of Ca^{2+} homeostasis by PTH.

(c) Regulation of Aldosterone secretion by renin-angiotensin system. 5,4,5

4 (A) Show the role of interplay of hormones in the following processes :

(a) Ovulation

(b) Parturition

(c) Maintenance of pregnancy. 4×3

(B) Give the basis of hormone contraception. 2

5. Give reasons for the following :

(a) Ketonuria is observed in IDDM and not in NIDDM.

(b) TSH levels are low in Graves' disease but high in Hoshimoto's disease.

(c) Hyperpigmentation is associated with Addison's disease.

(d) Development of Osteoporosis

(e) Cretinism is associated with severe mental retardation.

3,3,3,3,2

6. Give the role of the following :

(a) CCK in fat digestion

(b) Gastrin in protein digestion

(c) Cortisol in carbohydrate metabolism

- (d) GH in Growth
- (e) Prolactin in lactation.

3,3,3,3,2

7. Explain the following :

- (a) Flight and fright response
- (b) Down regulation of receptors
- (c) Hypothalamic – pituitary axis
- (d) IP3 as a second messenger.

4,4,3,3

8. Give important functions associated with the following :

- (a) Endorphins
- (b) Erythropoietin
- (c) PDGF
- (d) Somatostatin
- (e) Inhibin
- (f) Secretin
- (g) Calmodulin.

2×7