**[KT 504]** **AUGUST 2008** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 15 = 30)**

1. Explain the steps of beta oxidation of Palmitic acid. Add a note on Energetics.
2. What is Gluconeogenesis? Describe the pathway involved in Gluconeogenesis. Add a note on regulation of Gluconeogenesis.

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Functions of Vitamin C.
2. Digestion and absorption of lipids.
3. Hemoglobin S.
4. Isoenzymes.
5. Structure of cell membrane.
6. Define BMR. What are the factors that can affect BMR?
7. Define oxidative phosphorylation. Explain chemiosmotic theory.
8. Galactosemia.
9. Ketogenesis.
10. Glucose tolerance Test.

**III. Short Answer Questions :** **(10 x 2 = 20)**

1. Name the Essential fatty acids.
2. Significance of HMP shunt pathway.
3. Benedicts test.
4. Inhibitors of citric Acid cycle.
5. Chloride shift.
6. Functions of calcium.
7. Lipotropic factors.
8. Normal blood levels of 1. Cholestrol, 2. Bilirubin, 3. Sodium, 4.Pottasium.
9. Phospholipids.
10. Flurosis.

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**[KU 504]** **FEBRUARY 2009** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 15 = 30)**

1. Sources & fate of acetyl CoA, Explain the denovo synthesis of cholesterol and its regulation.
2. Explain how pyruvate enters the Kreb's citric acid cycle for oxidation. How many ATPs are produced in this pathway.

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Write a note an chemiosmotic theory.
2. Active transport.
3. Uronic acid pathway.
4. Insulin.
5. Wald's visual cycle.
6. Collagen.
7. Glycosaminoglycons (GAGS).
8. Chromatography.
9. Levels of organization of proteins.
10. Calcium Homeostasis.

**III. Short Answer Questions :** **(10 x 2 = 20)**

1. Key enzymes of glycolysis.
2. Fatty liver.
3. Lipid peroxidation.
4. Zymogens.
5. BMR.
6. Normal levels of : i) B.U.N ii) Fasting Serum Glucose iii) LDH iv) ALT
7. t : RNA
8. Vitamin K
9. Limiting amino acid.
10. Isoenzymes.

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**[KV 504]** **AUGUST 2009** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 15 = 30)**

1. What are porphyrias? Classify different types of porphyrias and give the enzyme defect and biochemical findings.

2. What is oxidative phosphorylation. Discuss the steps of the same and mention its significance.

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Classify RNA and explain the functions.
2. Hyper uricemia.
3. Renal glycosuria.
4. Cardiac troponin.
5. Structure of cholesterol and its importance in the body.
6. Beri Beri.
7. Enzyme poisons.
8. Flurosis.
9. What is protein energy malnutrition (PEM)? What are the types of PEM? Write the importance features.
10. Functions of vitamin C.

**III. Short Answer Questions :** **(10 x 2 = 20)**

1. Effect of temperature on enzyme activity.
2. Define epimer. Name two epimers.
3. Phosphotidyl inositol importance.
4. Biochemical functions of selenium.
5. Benedicts test.
6. Ribose and deoxy ribose.
7. Lysosomes.
8. Bence Jones proteins.
9. Bile salts.
10. Cori cycle.

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**[KW 504]** **FEBRUARY 2010** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 15 = 30)**

1. Define enzymes. Classify Enzymes with suitable examples.
   Explain the concept of active site of enzymes.
2. Describe the steps of HMP shunt pathway. What is its significance?
   How is it regulated?

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Nutritional importance of proteins.
2. Describe the requirement, sources, metabolic functions and deficiency manifestations of folic acid.
3. Explain with a neat labeled diagram of fluid mosaic model of biological membrane.
4. Total parenteral nutrition and its importance.
5. t – RNA.
6. Explain the metabolism and functions of HDL.
7. What are glycoproteins? Give three examples and its importance.
8. Chemiosmotic theory.
9. Rapaport leubering shunt pathway and its significance.
10. What are Nucleotides?
    Name any three biologically important nucleotides and their importance.

**III. Short Answer Questions :** **(10 x 2 = 20)**

1. Why sucrose is called a non reducing disaccharide?
2. Name the essential fatty acids.
3. Name any four biologically important compounds derived from cholesterol.
4. What are phospholipids? Give two examples.
5. Name the essential aminoacids.
6. Mention any two biological functions of albumin.
7. Name the aminoacids required for purine biosynthesis.
8. Sickle cell hemoglobin.
9. Specific dynamic action.
10. Write the principle and significance of biuret test.

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**[KX 504]** **AUGUST 2010** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 15 = 30)**

1. Describe the citric acid cycle. How is it regulated? What is its amphibolic role?
2. Describe the chemistry, absorption, functions and deficiency manifestations of Vitamin A.

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Inhibitors of Electron Transport Chain.
2. Transport of Bilirubin.
3. Vitamin E.
4. Substrate level Phosphorelation.
5. Gluconeogenesis.
6. Regulation of enzyme activity.
7. Abnormal hemoglobins.
8. Digestion and absorption of Triacylglycerols.
9. Biomedical importance of derivatives of Cholesterol.
10. Significance and disorders of Pentose Phosphate pathway.

**III. Short Answer Questions :** **(10 x 2 = 20)**

1. Mutarotation.
2. Subcellular organelles.
3. Free radicals.
4. Basal metabolic rate.
5. Essential amino acids.
6. Causes of fatty liver.
7. Renal glycosuria.
8. Role of HDL as scavenger of Cholesterol.
9. FIGLU.
10. Dietary fibers.

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**[KY 504]** **FEBRUARY 2011** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 15 = 30)**

1. Describe the chemistry, sources, daily requirement, biochemical functions and deficiency manifestations of Vitamin – B12.
2. Describe how cholesterol is synthesized in our body.
   What are the products formed from Cholesterol?

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Active form of Vitamin D and its biochemical role.
2. Catabolism of Hemoglobin.
3. Protein energy malnutrition.
4. Ketogenesis.
5. Fatty acid synthase complex.
6. Glycogen Metabolism.
7. Enzyme inhibition.
8. Glycosylated hemoglobin.
9. Oxidation phosphorylation.
10. Regulation of blood glucose.

**III. Short Answer Questions :** **(10 x 2 = 20)**

1. Zymogen.
2. Name two zinc containing enzymes.
3. Ferritin.
4. Define Km.
5. Functions of selenium.
6. What are cytochromes?
7. Brown adipose tissue.
8. Lactose intolerance.
9. Define respiratory quotient.
10. Functions of Vitamin K.

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**[KZ 504]** **AUGUST 2011** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : Three hours** **Maximum: 100 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Essay Questions :** **(2 x 10 = 20)**

1. Describe in detail TCA cycle and the energetics of the same.
   Justify why TCA cycle is called an amphibolic cycle.
2. Describe in detail the components and chemiosmotic theory of electron transport chain.

**II. Write Short notes on :** **(10 x 5 = 50)**

1. Role of Niacin as Coenzyme.
2. Classification of hyperlipidemias & their clinical importance.
3. Sphingolipidoses.
4. Biochemical role of Vitamin C.
5. Cori's cycle and Glucose Alanine cycle.
6. High Density Lipoprotein cycle.
7. Glycogenolysis.
8. Isomerism in carbohydrates.
9. Balanced Diet.
10. Fructose intolerance

**III Short Answer Questions :** **(15 x 2 = 30)**

1. Markers for lysosomes and mitochondria.
2. Fluorosis.
3. Role of Apo CII.
4. Define metalloenzymes with 2 examples.
5. Pulmonary surfactant – Structure and clinical importance.
6. Iodine number and its importance.
7. What is the function of Lipoprotein lipase?
8. Structure of lecithin.
9. Net Protein Utilization.
10. Chondroitin sulphate - Structure.
11. Double Reciprocal plot.
12. Alkaline phosphatase as a diagnostic tool.
13. What are the different forms of calcium in blood?
14. RDA and functions of Iodine.
15. Why Arachidonic acid is not considered 'purely' an essential fatty acid?

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**[LA 504]** **FEBRUARY 2012** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Revised (Non-Semester) Regulations**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : 180 Minutes** **Maximum: 50 Marks**

Answer **ALL** questions in the same order.
Draw Suitable diagrams wherever necessary

**I. Elaborate on :**

1. Describe the components and reactions of electron transport chain. Add a note on its inhibitors. **(1 x 10 = 10)**
2. Describe the dietary sources, daily requirement, biochemical function and deficiency symptoms of vitamin C **(1 x 5 = 5)**

**II. Write Short notes on :** **(10 x 2 = 20)**

1. Balanced diet
2. Causes of hypoglycaemia
3. Allosteric inhibition
4. Obesity
5. Alkaptonuria
6. Functions of mitochondria
7. Glycosylated haemoglobin
8. Neo glucogenesis
9. Thalessemias
10. Puring salvage path way

**III. Short Answers on :** **(15 x 1 = 15)**

1. Markers of nucleus and mitochondria
2. Name 2 tumour markers
3. Functions of phospho lipids
4. Name the essential fatty acids
5. Active forms of Thiamine and Riboflavin
6. Name the ketone bodies
7. Significance of rapaport – leubering cycle
8. Name two glycogen storage diseases
9. Significance of HMP shunt
10. Name the derivatives of cholesterol
11. Name the urea cycle disorder
12. Causes of increased blood urea level
13. Name the derivatives of tryptophan
14. Fluorosis
15. Parameter for the assessment of nutritive value of proteins

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**[LB 504]** **AUGUST 2012** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**

**Paper V – BIOCHEMISTRY – I**

***Q. P. Code : 524055***

**Time : 180 Minutes** **Maximum: 100 Marks**

Answer **ALL** questions.

Draw Suitable diagrams wherever necessary

| **I. Elaborate on:** | **Pages (Max.)** | **Time (Max.)** | **Marks (Max.)** |
|---|---|---|---|
| 1. What are the components of Mitochondrial Electron Transport Chain .Describe the events and inhibitors of Oxidative phosphorylation. | 16 | 25 | 15 |
| 2. Explain the significance and reactions of Hexose MonoPhosphate shunt and disorders associated to it. | 16 | 25 | 15 |
| **II. Write notes on:** | | | |
| 1. Isoenzymes of Lactate dehydrogenase and their significance. | 3 | 8 | 5 |
| 2. Functions, Deficiency Symptoms of Vitamin Thiamine. | 3 | 8 | 5 |
| 3. Calcium homeostasis and its disorder. | 3 | 8 | 5 |
| 4. Metabolic adaptation in Fed state. | 3 | 8 | 5 |
| 5. What are the various muco polysaccharides. Add a note on hyaluronic acid. | 3 | 8 | 5 |
| 6. Line Weaver Burk's Plot and its significance. | 3 | 8 | 5 |
| 7. Enzymes, coenzymes, inhibitors of Pyruvate Dehydrogenase Reaction. | 3 | 8 | 5 |
| 8. Alcohol metabolism. | 3 | 8 | 5 |
| 9. Fredrickson's classification of hyperlipprotenemias. | 3 | 8 | 5 |
| 10. Mention the types of heteropolysaccharides and their functions. | 3 | 8 | 5 |
| **III. Short Answers on:** | | | |
| 1. Cardiolipin. | 1 | 5 | 2 |
| 2. Mention the types of fatty acid oxidation. | 1 | 5 | 2 |
| 3. What are the products of Arachidonic acid? | 1 | 5 | 2 |
| 4. Carnitine. | 1 | 5 | 2 |
| 5. Anomerism. | 1 | 5 | 2 |
| 6. How Haemoglobin binds to oxygen. | 1 | 5 | 2 |
| 7. Km Value and its significance. | 1 | 5 | 2 |
| 8. Bronze Diabetes. | 1 | 5 | 2 |
| 9. WHO criteria for Diagnosis of Diabetes mellitus. | 1 | 5 | 2 |
| 10. Zellweger's syndrome. | 1 | 5 | 2 |

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**[LC 504]** **FEBRUARY 2013** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : 180 Minutes** **Maximum: 50 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Elaborate on:** **(2 x 7.5 = 15)**

1. What is the normal blood sugar level?
   Describe in detail how it is maintained within normal limits.
2. Mention the source, daily requirement of vitamin B12.
   Describe its absorption biochemical function and deficiency manifestations.

**II. Write notes on :** **(10 x 2.5 = 25)**

1. Fatty liver & lipotropic factors
2. Digestion and absorption, transport of iron
3. Isoenzymes and their diagnostic importance
4. Define Biological Oxidation & mechanism of ATP synthesis
5. The principles of balances diet
6. Transport mechanism-across cell membrane
7. Cytochrome P450
8. Galactosemia
9. Prostaglandins and their importance
10. Ketosis

**III. Short Answers on:** **(10 x 1 = 10)**

1. Key enzyme of cholesterol synthesis and its regulation
2. FIGLU
3. Refsum’s disease
4. Comparison between prokaryotic an eukaryotic cells
5. Glycosides
6. Metal cofactors of enzymes
7. Beri Beri
8. Lipid Profile
9. Limiting aminoacids
10. Glucose 6 Phosopate dehydrogenase enzyme

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**[LD 504]** **AUGUST 2013** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : 180 Minutes** **Maximum: 50 Marks**

**Answer ALL questions.**
**Draw Suitable diagrams wherever necessary**

**I. Elaborate on:** **(2 x 7.5 = 15)**

1. Classify enzymes. Describe in detail the various factors affecting enzyme action. Add a note on enzyme regulation
2. Name the ketone bodies? How are they formed and utilised in the body. Add a note on the metabolic changes in diabetic ketoacidosis.

**II. Write notes on:** **(10 x 2.5 = 25)**

1. 2,3 BPG- Formation & its role.
2. Mechanism of synthesis of ATP in ETC
3. Explain 'Methyl Folate trap'
4. Carnitine shuttle
5. What are dietary fibres and explain their importance in human nutrition with respect to the prevention of diseases
6. Write briefly about the significance of HMP shunt pathway
7. Sources, RDA & Biological role of Vitamin C
8. Describe the energetics of complete oxidation of 1 mole of glucose to CO2 & H2O under aerobic conditions
9. Bile salts – Synthesis & biological role.
10. Write briefly about calcium homeostasis.

**III. Short Answers on:** **(10 x 1 = 10)**

1. What are zymogens. Give an example
2. Mention two inhibitors of ETC with their site of action
3. What is specific dynamic action and importance in calculating caloric requirements of an individual.
4. What are trace mineral. Give RDA of any 2 of them.
5. What is Steatorrhoea ?
6. What is Suicide inhibition? Give an example
7. Laboratory Criteria for diagnosis of Diabetes Mellitus.
8. Name the insulin dependent glucose transporters and their tissue distribution.
9. What is pulmonary surfactant and its clinical importance?
10. What is the biochemical basis of development of cataract in Diabetes Mellitus.

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**[LE 504]** **FEBRUARY 2014** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**
**Paper V – BIOCHEMISTRY – I**
***Q. P. Code : 524055***

**Time : 180 Minutes** **Maximum: 50 Marks**

Answer **ALL** questions.
Draw Suitable diagrams wherever necessary

**I. Elaborate on:** **(2 x 7.5 = 15)**

1. Describe the synthesis of glucose from alanine and mention its regulation.
2. How are low-density lipoproteins (LDL) produced in the body?
   Describe, with the help of a diagram, their metabolic fate.
   What determines this process of their metabolic fate?
   Explain the clinical significance of this lipoprotein.

**II. Write notes on:** **(10 x 2.5 = 25)**

1. Name 5 enzymes, serum levels of which are increased in disease conditions, along with the corresponding disease condition where such changes are seen.
2. Briefly explain the chemiosmotic hypothesis of Mitchell.
3. What is meant by dietary fibre? Explain its importance in one's diet.
4. Explain the folate trap hypothesis.
5. What is surfactant? Explain its importance in the body in health and disease.
6. Explain, with a diagram, the fluid mosaic model of cell membranes.
7. What are good dietary sources of iron?
   Explain how iron is absorbed from the gastrointestinal tract.
8. Explain how the activity of an enzyme is affected by the pH of the medium.
9. What are the functions of calcium in the body?
10. Describe the functions and deficiency manifestations of vitamin A.

**III. Short Answers on:** **(10 x 1 = 10)**

1. Explain the mechanism of action of cyanide as a poison.
2. List 2 differences between hexokinase and glucokinase.
3. Give 2 examples of drugs that act as inhibitors of enzyme and name the enzyme that each one inhibits.
4. Explain the role of 2, 3 bisphosphoglycerate in supply of oxygen to tissue.
5. List 2 differences between foetal and adult forms of haemoglobin.
6. Why do patients with cholelithiasis often pass clay-coloured stools?
7. What is meant by the metabolic syndrome? What is the significance of this condition?
8. Write two functions & RDA of pyridoxine.
9. List 2 differences between marasmus and kwashiorkor?
10. Give two examples of substrate level phosphorylation.

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**[LF 504]** **AUGUST 2014** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**

**Paper V – BIOCHEMISTRY – I**

***Q. P. Code : 524055***

**Time: Three Hours** **Maximum: 50 Marks**

**Answer ALL questions.**
**Draw Suitable diagrams wherever necessary**

**I. Elaborate on:** **(1 x 10 = 10)**

1. Describe the beta oxidation of Palmitic acid and its regulation.

**II. Write Notes on:** **(2 x 5 = 10)**

1. Coenzymic role of Pyridoxine.
2. Factors regulating blood calcium.

**III. Short Answers on:** **(10 x 3 = 30)**

1. Wilson’s disease.
2. Define isoenzymes and give two examples.
3. Specific dynamic action.
4. Chemiosmotic theory.
5. Von Gierke’s disease.
6. Pyruvate dehydrogenase complex.
7. Ionophores.
8. Oral glucose tolerance test.
9. Deficiency manifestations of vitamin D.
10. Biochemical functions of Iron.

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**[LF 504]** **NOVEMBER 2014** **Sub. Code : 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**

**Paper V – BIOCHEMISTRY – I**

***Q. P. Code : 524055***

**Time: Three Hours** **Maximum: 50 Marks**

**Answer ALL questions.**
**Draw Suitable diagrams wherever necessary**

**I. Elaborate on:** **(1 x 10 = 10)**

1. Describe in detail about the metabolic change and complications in Diabetes Mellitus. Add a short note on the biochemical investigations to be done in Diabetes Mellitus.

**II. Write Notes on:** **(2 x 5 = 10)**

1. Write in detail about compounds which affects Electron Transport Chain & Oxidative Phosphorylation.
2. Write about the biological actions & clinical applications of Prostaglandins.

**III. Short Answers on:** **(10 x 3 = 30)**

1. Therapeutic uses of Enzymes.
2. Types of Lipases.
3. Lipotrophic Factors.
4. Metabolism of Propionyl CoA.
5. Prevention of Atherosclerosis.
6. Allosteric regulation.
7. Significance of multi-enzyme complexes with example.
8. Vitamin -D deficiency.
9. Functions of Phosphate.
10. What is Saponification and Iodine Number? Write its importance.

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**[LG 504]** **FEBRUARY 2015** **Sub.Code :4055**

**FIRST YEAR M.B.B.S. DEGREE EXAMINATION**
**PAPER V – BIOCHEMISTRY - I**

***Q.P. Code: 524055***

**Time: Three hours** **Maximum : 50 Marks**

**Answer All Questions**

**I. Essay:** **(1 x 10 = 10)**

1. Write in detail about the dietary sources, daily requirement and biochemical functions of Thiamine. Add a note on the deficiency manifestations.

**II. Write notes on:** **(2 x 5 = 10)**

1. Apolipoproteins
2. Metabolism of Adipose tissue in fasting condition

**III. Short answers on:** **(10 x 3 = 30)**

1. Fate of Oxaloacetate
2. Liver Enzymes
3. Functions of Magnesium
4. Dietary fibres
5. Cytochrome $P_{450}$
6. Functions of Phospholipids
7. Suicide Inhibition
8. Causes for Abnormal GTT Curves
9. Biologically important peptides
10. Biological value of proteins

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**[LH 504]** **AUGUST 2015** **Sub. Code: 4055**

**FIRST M.B.B.S. DEGREE EXAMINATION**

**PAPER V – BIOCHEMISTRY - I**

***Q.P. Code: 524055***

**Time : Three Hours** **Maximum : 50 marks**

**Answer ALL questions**

**I. Elaborate:** **(1 x 10 = 10)**

1. Component and function of phospholipids.

**II. Write notes on :** **(2 x 5 = 10)**

1. Glycolysis in RBC.
2. Shuttle pathways across mitochondrial membranes.

**III. Short answers on :** **(10 x 3 = 30)**

1. Ocular changes in vitamin A deficiency.
2. Amphipathic lipids.
3. Kwashiorkor.
4. Enzymes in diagnosis of Myocardial infarction.
5. Biochemical functions of zinc.
6. Hormones that regulate blood calcium level.
7. Mechanism of cyanide poisoning.
8. Metabolism of glucose-6-phosphate.
9. Lipoprotein lipase.
10. Cori cycle.

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