[MBBS 0221] FEBRUARY 2021 **Sub.Code :6055**

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

Q.P. Code: 526055

Time: Three hours **Maximum: 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. Describe the structure of biological membranes. Discuss the various transport mechanisms across membranes with suitable examples.
2. How are dietary lipids digested and absorbed? Write about the transport of lipids in plasma.

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

1. Competitive inhibition of enzyme activity.
2. Biochemical features seen in blood and urine of a patient with hemolytic anemia.
3. Functions of Vitamin – C
4. Anaplerotic role of citric acid cycle.
5. Define Gluconeogenesis and explain the various steps.
6. Formation and fate of Pyruvate.
7. Biological value of Proteins.
8. Enumerate the compounds derived from cholesterol and mention their biochemical functions.
9. Synthesis and regulation of Porphyrins.
10. Structure and functions of Mitochondria.

[MBBS 0821] AUGUST 2021 **Sub.Code :6055**

MAY 2021 SUPPLEMENTRY

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

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. Explain the mode of action of Enzymes and describe the factors affecting Enzyme activity? Brief the analytical uses of enzymes with example.
2. Describe the reactions of Kreb's Cycle and its regulation? Add a note on its anaplerotic role.

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

1. Fluid mosaic model of cell.
2. State the differences between
   a) Starch and Glycogen.
   b) Dextrin and Dextran.
3. Beta oxidation of Palmitic acid.
4. Mention the recommended dietary allowance, biochemical functions and deficiency manifestations of Vitamin – E
5. Chemiosmotic theory and mechanism of ATP synthesis
6. Brief the risk factors of cardiovascular disease and its preventive methods
7. What is Nitrogen balance? Enumerate the factors affecting nitrogen balance
8. List the inborn errors associated with heme metabolism and their features.
9. Oral Glucose Tolerance Test: Indications, Method and Interpretation.
10. Regulation and significance of HMP shunt.

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0222] FEBRUARY 2022 **Sub.Code : 6055**

M.B.B.S. DEGREE EXAMINATION

(For the candidates admitted from the Academic Year 2019-2020)

FIRST YEAR

PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. Describe the sources, biochemical functions, normal requirement and deficiency manifestations of vitamin D.

2. Classify lipoproteins. Explain their biological significance.

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

1. Glycated Hemoglobin.
2. Michaelis Constant (Km).
3. Glycogen storage diseases.
4. Acute intermittent porphyria.
5. Inhibitors of ETC.
6. Significance of HMP shunt pathway.
7. Protein energy malnutrition.
8. Glucose Transporters.
9. Pyridoxine.
10. Poly unsaturated fatty acids.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0522] **MAY 2022** **Sub. Code : 6055**

M.B.B.S. DEGREE EXAMINATION

(For the candidates admitted from the Academic Year 2019-2020)

FIRST YEAR – SUPPLEMENTARY (CBME)

PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. What is the normal fasting glucose level? How is it regulated?

2. Write an essay on fatty acid oxidation and add a note on disorders associate with it.

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

1. Antioxidants.
2. Basal Metabolic Rate.
3. Suicide Inhibition.
4. Lactate dehydrogenase.
5. Glucuronic acid pathway.
6. Thalassemias.
7. Folic acid.
8. LDL – Cholesterol.
9. Inhibitors of TCA Cycle.
10. PUFAs (Polyunsaturated fatty acids) .

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0123] **JANUARY 2023** **Sub. Code : 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2019-2020)

FIRST YEAR –(CBME)
PAPER I – BIOCHEMISTRY
Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. A four year old girl was brought to the OPD for not being able to walk properly. O/E she had bowed legs, thick wrists and dental caries. Her weight (8 kgs) and height (72.5cm) were below third percentile for her age. X-Ray shows cupping and widening of metaphyseal end of bone, poor bone mineralization.
   - Lab investigations showed:

   Serum Calcium – 8.5 mg/dL, Serum phosphorous – 3.0 mg/dL, Serum Alkaline phosphatase – 924 U/L, Serum 25-OH Vitamin D – 12 ng /mL.
   a) What is your provisional diagnosis?
   b) Write the daily requirement and sources of the deficient nutrient in the above condition and its main functions.
   c) Write in detail about its deficiency manifestations in children and adults.
   d) What are the causes of this disease?

2. Explain the steps of beta oxidation of Palmitic acid and its Energetics. Add a note on alpha and beta oxidation disorders.

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

1. Diagnostic criteria for diabetes mellitus and laboratory investigation in Diabetes mellitus.
2. Molecular basis and clinical features of Sickle cell anemia and Thalasemias.
3. Passive Transport Mechanisms.
4. A 4 month old child was brought with the history of vomiting, feeding difficulties and Failure to thrive along with developmental delay. The child was born at full term by normal delivery (birth weight 3 kg) and exclusively breast fed. The child also had suffered from severe and prolonged neonatal jaundice. The child now weighs 4 kg. O/E. He had hepatomegaly with bilateral cataract.
   a) What is your diagnosis?
   b) What is the Biochemical defect?
   c) What is the Biochemical test for reducing sugars?
   d) What are the non-carbohydrate reducing substances in urine?
   e) What is the treatment for this disease?
5. Metabolism of LDL with clinical importance.
6. Protein energy malnutrition.
7. Functions of prostaglandins.
8. Glycogen storage disorders.
9. Classify enzymes with examples.
10. Write short notes on Metabolic syndrome.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0323] MARCH 2023 Sub. Code : 6055

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2019-2020)

FIRST YEAR – SUPPLEMENTARY (CBME)

PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. A 21-year-old woman who recently began taking birth control pills presents to the emergency room with cramping abdominal pain, anxiety, paranoia, and hallucinations. A surgical evaluation, including ultrasound and computed tomography scan, fails to demonstrate an acute abdominal process. An urinalysis reveals an increase in urine ALA and PBG.
   a) What is your probable diagnosis?
   b) Which enzyme deficiency leads to this condition?
   c) Explain in detail the metabolic pathway that is defective in this patient.
   d) What is the biochemical basis of the clinical features?
   e) Give reasons for the development of symptoms after taking birth control pills.
2. How are dietary lipids digested and absorbed? Explain how lipids are transported in plasma.

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

1. Chemiosmotic theory of Oxidative Phosphorylation.
2. Polyol pathway and its importance in the pathogenesis of complications of Diabetes Mellitus.
3. Competitive inhibition of enzyme activity.
4. A 10 year old boy had difficulty in vision at night. However his vision was quite normal during day time except when he entered a dimly lit room. On investigation, his plasma retinol levels were found to be low.
   a) Suggest the probable diagnosis. Which nutrient deficiency causes this disease?
   b) Enumerate any four functions of the nutrient.
   c) Write a note on Walds visual cycle.
5. Biological value of Proteins.
6. Enumerate the compounds derived from cholesterol and mention their biochemical functions.
7. Why is Kreb's cycle anabolic in nature?
8. Role of insulin and glucagon in the regulation of glycogen metabolism.
9. Glycogen Storage Disorders.
10. Structure and functions of Mitochondria.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 1123] **NOVEMBER 2023** **Sub. Code : 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2019-2020)

FIRST YEAR – (CBME)
PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. A 26 year old female presented with history of anorexia, constipation, fatigue, poor memory, irritability, sleep disturbance; bilateral, symmetrical lower extremities paraethesia with burning pain and muscle cramps. On examination there was decreased vibratory position sensation, absent knee and ankle jerk and muscle atrophy. Her diet consisted of polished rice without pulses, oil seeds etc. The enzyme transketolase level in erythrocytes was low.
   a) What is your probable diagnosis?
   b) Mention the cause for this condition.
   c) Name the sources and required daily allowance (RDA) of the deficient nutrient.
   d) Why erythrocyte transketolase level was measured in this condition?
   e) List out the enzymes dependent on this nutrient.
   f) Explain the biochemical basis of the clinical features in this patient.
   g) Note on management of this condition.

2. Explain in detail about degradation of heme and fate of bilirubin. Write down the causes of hyperbilirubinaemia and the lab investigations in differential diagnosis of jaundice. Write a note on jaundice in newborn.

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

1. What are mucopolysaccharides? Name the mucopolysaccharide present in the glomerular basement membrane and its clinical importance. Mention the two mucopolysaccharides which are elevated in Hurler's syndrome? Which mucopolysaccharide maintains the transparency of cornea?
2. Biochemical functions of Vitamin C.
3. What is calorific value? Calculate the energy requirement of a 50 year old moderate worker.
4. Explain the effect of temperature and substrate concentration on enzyme activity with a graph.
5. Write briefly about diseases caused due to abnormalities of membrane proteins –
   a) Cystic fibrosis.
   b) Wilson's disease.
   c) Hereditary spherocytosis.
6. Discuss about importance of Communication skills in Doctor - Patient encounters.

7. Deficiency of lung surfactant causes Respiratory Distress Syndrome.
    a) What is the composition of lung surfactant?
    b) What is the biochemical basis for Respiratory distress syndrome?
    c) What is the significance of L/S ratio?
8. Pyruvate kinase deficiency and glucose-6-phosphate dehydrogenase deficiency cause hemolytic anemia – Give reasons.
9. Give reasons for hypercholesterolemia in the following conditions:
    a) Hypothyroidism.
    b) Diabetes mellitus.
    c) Obstructive jaundice.
    d) Nephritic syndrome.
    e) Familial hypercholesterolemia.
10. A 12 year old girl presented with stiffness and tingling of hands and feet, carpopedal spasm. On examination Trousseau's sign was positive, Chvostek's sign was positive. On laboratory evaluation, serum calcium was significantly reduced.
    a) Interpret the findings and suggest the probable diagnosis.
    b) Mention the reference range and dietary sources of the nutrient.
    c) Explain the role of hormones in regulating-the blood levels of this nutrient.

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[MBBS 1123]

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0124] **JANUARY 2024** **Sub. Code : 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2019-2020)

FIRST YEAR – SUPPLEMENTARY (CBME)

PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. A 3-year-old male child, presented with blisters on exposed areas since the age of around 6 months. The blisters used to heal with atrophic scars. Since early infancy the mother had noticed reddish colored urine. The child's mental and physical development had been normal. There was no family history of a similar problem. On examination, the child's face was badly scarred. There was hypertrichosis on the shoulders, arms and face. The teeth were of coppery-red color. A diagnosis of Congenital Erythropoietic Porphyria was made.
   a) Name the enzyme defective in Congenital Erythopoietic Porphyria.
   b) What is the biochemical basis of Congenital Erythropoietic Porphyria presenting with erythrodontia (red teeth) and port wine urine (red urine).
   c) Will ALA and PBG be elevated in this condition? Why?
   d) What are the differences between Acute Inrermittent Porphyria and Congenital Erythropietic Porphyria?
   e) What is / are the effect of lead poisoning on Heme synthesis?

2. A child presents with hypoglycemia, hypophosphatemia, jaundice and hepatomegaly after transitioning from mother's milk to infant foods. He is diagnosed with hereditary fructose intolerance.
   a) Name the enzyme that is defective in this condition.
   b) Describe in detail normal fructose metabolism.
   c) Why is fructose more lipogenic than glucose?
   d) Why does fructose intolerance present with hypoglycemia and hypophosphatemia?
   e) How did the clinician exclude Galactosemia in this child?
   f) What is expected if Benedict's test is performed in the child's urine? Why?

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

1. A 70 hrs old new born baby, delivered normally was brought to the paediatric OPD with H/o passing yellow coloured urine and yellowish discoloration of conjunctive and the body skin.
   a) What are the investigations you do to confirm Jaundice?
   b) Brief the clinical significance of enzymes with their normal value involved in Liver diseases?

2. A 6 month old infant presented with failure to thrive, based on deviation across two major percentiles on standardized growth curves, despite normal feeds. His serum calcium was normal, phosphorus and Vitamin D were very low, Alkaline Phosphatase level (ALP) and parathormone level (PTH) were very high. He was diagnosed as a case of nutritional Vitamin D deficiency.
   a) Why does Vitamin D deficiency cause an elevated PTH and ALP?
   b) How is Vitamin D activated?
   c) How does Vitamin D regulate calcium and phosphorus levels?

3. 55 year old alcoholic was brought to the emergency department by his friends, during their usual hangout at the local bar, he had passed out and they were unable to revive him. On admission, his blood glucose was low.
   a) Why does chronic alcoholism present with hypoglycemia?
   b) Alcohol is considered as a source of empty calorie. Why?

4. Following an early morning run, a 29 year old man consumes a carbohydrate rich South Indian breakfast.
   a) Which hormone will be released into the circulation of this person?
   b) What is the common allosteric regulator? Which regulated glycolysis and gluconeogenesis?
   c) Describe in detail how glycolysis and gluconeogenesis will be regulated with the help of a tandem enzyme in this person in this scenario.

5. A 56 year old male is treated with statins for reducing blood cholesterol. Two weeks after initiation of treatment he presented with muscle pain.
   a) What is the mechanism of action of satins?
   b) What are the by-products of cholesterol synthesis?
   c) Mention two derivatives of cholesterol.
   d) How is cholesterol synthesis regulated?

6. What are the ways by which you can get a consent from a patient for blood sample collection for diagnosis? What are the ethical issues associated with using a blood sample in a clinical laboratory?

7. A 35-year-old male with central obesity undergoes a master health checkup. His abdominal Ultrasound reveals grade II fatty liver. He blames it on the high fatty diet prepared by his wife. The physician denies that as the cause.
   a) Why doesn't dietary lipid cause fatty liver changes?
   b) What are lipotrophic factors? Give examples.
   c) What are the causes of fatty liver?
   d) Mention the biochemical basis of fatty liver in one of the causes.

8. A Village Health Nurse instructs a mother to provide her child, a drink made with 6 level teaspoons of sugar and ½ level teaspoon of salt dissolved in 1 liter of clean water to rehydrate the child.
   a) Why is sugar included in oral rehydration solution?
   b) What are the differences between passive diffusion and active transport?
   c) What is facilitated passive diffusion? Give examples.

9. Inspired by Sylvester Stallone's "Rocky" body, a 23-year-old male wants to build his muscle and as instructed by his trainer, he takes 6 raw eggs every day. After 2 months, when he was working out, he suddenly passed out and his plasma glucose was 60mg/dL. After treating him, the physician advised him to refrain from having raw eggs and warned him that raw egg consumption causes low glucose.
   a) Why does raw egg consumption cause low glucose?
   b) What are the products of odd chain fatty acid oxidation?
   c) How are the products of odd chain fatty acid oxidation metabolized further?

10. A 51 year old person with a recent episode of Myocardial infarction was prescribed Aspirin as an antiplatelet drug by inhibiting cyclooxygenase enzyme.
   a) What are Eicosanoids?
   b) Name two of them.
   c) Mention their functions.
   d) How does Aspirin act as an antiplatelet drug by inhibiting cyclooxygenase?

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[MBBS 0124]

THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0824] **AUGUST 2024** **Sub. Code : 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2020 -2021 Onwards)

FIRST YEAR – (CBME)
PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. Explain the Metabolic Derangements in Diabetes Mellitus. Write a note on ADA criteria for Diagnosis of Diabetes Mellitus.

2. A 24 years old woman presented with severe abdominal pain, nausea, vomiting, palpitation and hypertension. Patient had hallucination and seizures. She had similar attacks in the past. She did not have photosensitivity. Urine was positive for Porphobilinogen.
   a) What is the probable diagnosis?
   b) Describe the pathway of Heme synthesis and Regulation.
   c) Why did the patient not have Photosensitivity?

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

1. Importance of Dietary Fibre.
2. Anaplerotic role of Kreb's cycle.
3. Physiological role and deficiency manifestation of Biotin.
4. Sources, RDA and deficiency manifestation of Vitamin B12.
5. ATP Synthase.
6. Specificity of Enzymes.
7. Glycogenesis – Reaction and Regulation.
8. Cardiac Markers.
9. Lactose intolerance.
10. Discuss the structure and functions of nucleus with suitable illustration.

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THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY

[MBBS 0924] **SEPTEMBER 2024** **Sub. Code : 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2020 -2021 Onwards)

FIRST PROFESSIONAL – (CBME) - SUPPLEMENTARY
PAPER I – BIOCHEMISTRY
Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. Define Gluconeogenesis. What are the precursors of Gluconeogenesis? Write the overview of Pathway of Gluconeogenesis with key enzymes.

2. A 9-year-old girl presented with muscle pain and cramps, tingling of hands and feet and recurrent carpopedal spasm. She is a strict vegetarian, not taking milk and milk products. On general examination, she is normal. On investigation, Serum Calcium – 6.5mg%.
   a) What is the probable diagnosis?
   b) What is the normal Serum Calcium level?
   c) Explain the homeostasis of Calcium in the blood.

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

1. Balanced Diet.
2. Amphibolic nature of Kreb's cycle.
3. Physiological role and deficiency manifestation of Riboflavin.
4. How will you reveal the increased Blood sugar level to the patient and need for medication?
5. Structure of Mitochondria.
6. Types of Enzyme Inhibition with suitable examples.
7. Reactions and Regulation of Glycogenolysis.
8. Galactosemia.
9. Clinical Importance of Liver Enzymes.
10. Hemolytic Disease of Newborn.

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THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

[MBBS 0825] **AUGUST 2025** **Sub. Code: 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2021 – 2022 to 2023 – 2024)

FIRST PROFESSIONAL – (CBME)
PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. A 12-year-old girl is admitted with history if abdominal distention and frequent episodes of weakness, sweating and pallor that subside on eating. On examination, the patient had hepatomegaly and blood investigations showed fasting blood glucose – 40 mg/dl, triglycerides, lactic acid and ketone bodies elevated.
   a) What is the probable diagnosis?
   b) Describe metabolism of glycogen in liver in fed and fasting state with its regulation.
   c) Mention the defective enzyme in the above patient.
   d) Why hypoglycemia results in elevated levels of ketone bodies in blood?

2. A 50-year-old male patient, a known diabetic presents to the emergency with complaints of chest pain of half an hour duration. Biochemical investigations revealed AST-55U/L, ALT-15U/L, Creatine Kinase along with LDH are elevated.
   a) What is your provisional diagnosis?
   b) What are the other markers that can be estimated in this patient with a note on flipped pattern?
   c) Mention two enzymes used therapeutically.

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

1. Niacin and its role in metabolism.

2. Protein synthesis in a cell occurs in free ribosomes and in RER. The proteins to reach their destination need to be sorted and targeted.
   a) Identify the cell organelle where sorting occurs.
   b) Describe the structure and functions of the above cellular organelle.

3. A 34-year-old man comes to the outpatient clinic. He is asymptomatic. His lipid profile reveals: se. cholesterol – 30mg/dl and triglycerides – 136mg/dl. On inspection his serum is white and cream-like
   a) Which lipoproteins are likely to be increased?
   b) Describe the metabolism of chylomicrons.

4. Define substrate level phosphorylation with example. Describe mechanism of ATP synthesis in mitochondria.

5. A 10-year-old boy had difficulty in vision at night. However, his vision was normal during daytime except when entering dimly lit room. Blood investigation revealed low retinol levels.
   a) Suggest the probable diagnosis and the nutrient deficiency causing the disease.
   b) Mention the active forms of the nutrient with their functions.
   c) Explain walds visual cycle.

6. Discuss the metabolic fate of acetylCoA.

7. What is basal metabolic rate? Discuss factors affecting BMR with a note on normal value of BMR.

8. NADH produced in cytoplasm during Glycolysis has to reach ETC located on inner mitochondrial membrane to be oxidized. Explain the transport of NADH from cytoplasm to mitochondrial along with the number of ATPs generated.

9. Describe the formation, transport and excretion of Bilirubin in the body with its normal levels.

10. Blood group substances.

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[MBBS 0825]

THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY

[MBBS 1025] **OCTOBER 2025** **Sub. Code: 6055**

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2021 – 2022 to 2023 – 2024)

FIRST PROFESSIONAL – SUPPLEMENTARY - (CBME)
PAPER I – BIOCHEMISTRY

Q.P. Code: 526055

Time: Three hours **Maximum : 100 Marks (80 Theory + 20MCQs)**

Answer All Questions

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

1. A 13-year-old boy a known case of insulin dependent type 1 diabetes mellitus is brought to his family pediatrician because he is urinating frequently throughout the day night. He is continuously thirsty and his breath has a fruity odour. He skipped insulin doses. He is on the verge of becoming comatose. Blood investigations done showed a high blood concentration of glucose-500 mg/dl and ketone bodies-70mg/dl (normal <3mg/dl) and pH determined was 7.25.
   a) State the likely diagnosis?
   b) Name the ketone bodies. Discuss in detail the metabolism (synthesis and utilization) of ketone bodies.
   c) Analyse why the liver cannot utilize ketone bodies
   d) Mention the causes of fruity odour of breath other than the condition listed above.

2. 2,4 dinitrophenol (DNP), an uncoupler of oxidative phosphorylation was used as a Weight loss agent in 1930s. Its usage was discontinued in 1939 on account of fatal overdoses. It resulted in elevated body temperatures.
   a) Define oxidative phosphorylation. Describe the components of electron transport chain (ETC) and the flow of electron resulting in oxidation of reduced coenzymes and ATP synthesis, with a diagram.
   b) List the inhibitors and uncouplers of ETC with suitable illustration.
   c) Reason out why DNP causes elevation of body temperature.

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

1. A 2-day old baby becomes jaundiced. The results of liver function tests are normal
   a) Identify the provisional diagnosis.
   b) Discuss the causes and biochemical findings in this type of jaundice.
   c) Mention the complication expected and the biochemical basis of treatment for this patient.

2. Why treatment with ethanol is useful for methanol poisoning. Discuss in terms of Km of enzymatic reactions, the type of enzyme inhibition with suitable illustration.

3. All newborn babies are administered a single intramuscular injection of Vitamin K soon after birth.
   a) What is the rationale in administering Vitamin K injection?
   b) Discuss the sources, Biochemical functions and deficiency manifestations of the vitamin K.
   c) Mention vitamin K inhibitors used as drugs.

4. A person is recovering from massive haemorrhage. How would this affect TCA cycle? Discuss with reference to the Anaplerotic role of citric acid cycle.

5. How will you reveal the increased Cholesterol level to the patient and need for medication?

6. A patient with irritable bowel syndrome is prescribed a cellulose containing dietary supplementation. Discuss the importance of dietary fiber in providing health benefits beyond basic nutrition.

7. A 52-year-old women presents with fatigue of several months duration. Blood investigations reveal a microcytic anaemia, reduced Hb levels and elevated Homocysteine and methylmalonic acid levels.
   a) Mention the vitamin deficiency in this patient.
   b) Discuss the sources, RDA, Biochemical functions and deficiency manifestations of the vitamin.

8. A 3-month-old girl is developing cataracts. On examination baby's development is normal except not having a social smile and not able to track objects. Tests on baby's urine are positive for reducing sugars but negative for glucose. Mucic acid test is positive.
   a) What is your probable diagnosis?
   b) Describe the metabolic pathway of the reducing sugar involved with the biochemical basis of cataract.

9. In a case of acute intermittent Porphyria, symptoms are exaggerated on consuming alcohol. Why? Discuss AIP with its biochemical basis.

10. A 64-year-old male patient presents with history of increased frequency of stools which are pale, foul smelling and difficult to flush suggesting malabsorption of fat.
    a) What is the diagnosis?
    b) Discuss the role of bile salts in lipid digestion and absorption with a note on Enterohepatic circulation.

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