[MBBS 0221] **FEBRUARY 2021** **Sub.Code :6056**

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

Q.P. Code: 526056

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

Answer All Questions

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

1. What is the normal pH of blood? Discuss how the pH of blood is maintained.
2. Discuss the metabolism of Phenylalanine. Write a note on the inborn error associated with Phenylalanine.

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

1. Compounds derived from Glycine and their functions.
2. Hyperammonemias.
3. Copper metabolism and its applied aspects.
4. Telomerase and its application.
5. Lesch-Nyhan syndrome.
6. Inhibitors of Purine nucleotide biosynthesis.
7. Metabolic Acidosis.
8. Absorption of dietary Iron.
9. Biochemical features of Cancer cells.
10. Conjugation reactions in Xenobiotics.

[MBBS 0821] AUGUST 2021 **Sub.Code :6056**

MAY 2021 SUPPLEMENTRY

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

Q.P. Code: 526056

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

Answer All Questions

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

1. Describe the process of replication in Prokaryotes? Add a note on inhibitors of DNA Replication?
2. Explain the catabolic pathways of Tyrosine and disorders associated with Tyrosine metabolism?

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

1. Brief the functions and diagnostic importance of plasma proteins present in the beta region of electrophoretic pattern?
2. Mention the causes, signs, symptoms and treatment of Hypokalemia?
3. Explain the precipitation reactions of protein?
4. Describe the DNA repair mechanisms with suitable clinical examples?
5. Explain the role of Kidney in regulation of pH?
6. Mention the sources, recommended dietary allowance, function and deficiency manifestation of Copper.
7. Brief the causes, symptoms and treatment of Gout?
8. Applications of DNA recombinant technology.
9. Brief the in vitro thyroid function tests.
10. Explain the cellular signaling and defense mechanism of free radicals?

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

[MBBS 0222] FEBRUARY 2022 **Sub.Code : 6056**

M.B.B.S. DEGREE EXAMINATION

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

FIRST YEAR

PAPER II – BIOCHEMISTRY

Q.P. Code: 526056

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

Answer All Questions

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

1. Write an essay on Recombinant DNA technology. What are the important applications of the technique ?

2. Enumerate liver function tests with their clinical significance.

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

1. Potassium.
2. Blotting techniques.
3. Tumour markers.
4. Role of kidney in the regulation of pH.
5. Albumin.
6. Gout.
7. Nitric oxide.
8. Branched chain amino acids.
9. Hypocalcemia.
10. Post translational modification.

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

[MBBS 0522] **MAY 2022** **Sub. Code :6056**

M.B.B.S. DEGREE EXAMINATION

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

FIRST YEAR – SUPPLEMENTARY (CBME)

PAPER II – BIOCHEMISTRY

Q.P. Code: 526056

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

Answer All Questions

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

1. Describe the phases of activation, initiation, elongation and termination of biosynthesis of protein. Add a note on its inhibitors.

2. Describe in detail about Thyroid function tests.

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

1. Respiratory acidosis.
2. Creatinine clearance test.
3. Fluorosis.
4. Primary structure of protein.
5. ELISA.
6. Transmethylation reaction.
7. Glutamine.
8. Collagen.
9. Hyponatremia.
10. Post transcriptional modification.

****

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

[MBBS 0123] JANUARY 2023 Sub. Code : 6056

M.B.B.S. DEGREE EXAMINATION
(For the candidates admitted from the Academic Year 2019-2020)
FIRST YEAR – (CBME)
PAPER II – BIOCHEMISTRY
Q.P. Code: 526056

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

Answer All Questions

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

1. Write in detail about the initiation, elongation and termination of transcription. Give an account of post transcriptional processing.
2. A 40 year old woman complains of tiredness and appears pale. She is experiencing a heavy and prolonged menstrual flow. Blood investigation shows decreased haemoglobin and microcytic hypochromic Red Blood Cells.
   a) What are the causes of Anaemia?
   b) Describe in detail about Iron homeostasis.
   c) How will you diagnose and treat Iron deficiency?

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

1. Synthesis and mechanism of action of Nitric Oxide.
2. Homocystinurias.
3. Hyperuricemias.
4. Normal Anion gap and High Anion gap metabolic acidosis.
5. Phase Two detoxification.
6. Special products formed from Glycine.
7. A 24 year old physiotherapist consulted his general practioner because of excessive sweating and was also concerned that his eyes seemed to have become more prominent and that he had lost weight recently although his appetite was normal. He also complained of palpitation. On examination, his doctor observed that his pulse rate was 100 / min at rest and that he had a slightly enlarged thyroid gland. Serum TSH: < 0.1 mIU/ mL (0.3 – 5 μIU/mL), Free T_4:3.2 ng/ dL (0.8 – 2.7 ng/dL) Free T_3: 880 pg/ dL (210- 440 pg/dL).
   a) What is your diagnosis? Justify.
   b) What is the cause of tachycardia in this condition?
   c) What is the explanation for the eye prominence in this condition?
8. Electrophoresis.
9. Antioxidants.
10. A 42 year old male was diagnosed with poorly differentiated adenocarcinoma. A family counselling revealed that the proband had five family members with colorectal cancer diagnosed before 45 years of age. Hence all family members were counselled that this would have been caused by a defect of DNA repair and that all family members older than 25 years should undergo regular colonoscopic examination.
    a) What are the different DNA repair mechanisms? Which repair defect causes Hereditary Non polyposis Colon Cancer (HNPCC)? Describe in detail about the repair mechanism.

****

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

[MBBS 0323] MARCH 2023 Sub. Code : 6056

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

FIRST YEAR – SUPPLEMEENTARY (CBME)
PAPER II – BIOCHEMISTRY

Q.P. Code: 526056

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

Answer All Questions

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

1. A 6 year old boy presents with periodic aggressive behaviour. His urinary ALA is elevated. On examination, he is icteric. A mild hepatomegaly is observed. Blood examination revealed massive elevation of AFP. HPLC and Tandem Mass Spectrometry examination revealed elevation of succinylacetone. A diagnosis of Type I Tyrosinemia is made.
   a) What is the most probable enzyme defect? And why does he present with elevation of ALA and neuropsychiatric manifestation?
   b) Describe in detail all tyrosine metabolism disorders.
   c) Add a note on special products formed from Tyrosine.

2. What is cloning? Mention the various types of cloning.
   Describe in detail the steps involved and tools required in recombinant DNA technology.

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

1. Purine salvage pathway.
2. Explain the role of lungs in acid base homeostasis
3. A 5 year old boy brought to the hospital with complaints of mental retardation, hypopigmented patches all over the body and mousy odour of urine. On examination his eyes were blue. What is the most probable diagnosis and What is the defective enzyme? Explain the biochemical basis of the clinical features seen in this boy.
4. Serum protein electrophoresis.
5. Cell cycle.
6. Role of Parathormone in Calcium, Phosphate homeostasis.
7. Define Xenobiotics and add a note on the various detoxification reactions.
8. Mutation.
9. Secondary structure of protein.
10. A patient had seizures and usually appeared weak, tired and showed deposition of brown coloured ring in the descemets layer of the cornea and hepatomegaly was noted.
    a) Name the disorder.
    b) Which mineral metabolism is deranged?
    c) What is the biochemical defect?
    d) Mention the functional role of concerned mineral.

******

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

[MBBS 1123] **NOVEMBER 2023** **Sub. Code : 6056**

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

FIRST YEAR – (CBME)
PAPER II – BIOCHEMISTRY

Q.P. Code: 526056

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

Answer All Questions

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

1. Give the salient features of Electrophoresis. What are the abnormalities that you could detect in Serum Electrophoresis?

2. Explain the Operon concept of regulation of Genetic expression. Mention the differences in Eukaryotic cells.

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

1. PCR.
2. Secondary structure of protein.
3. Alanine.
4. Causes and deficiency manifestation of Iron.
5. Homocystinuria.
6. Histidine.
7. Amylase.
8. Metabolic alkalosis.
9. DNA repair mechanism.
10. Genetic code.

****

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

[MBBS 0124] JANUARY 2024 Sub. Code : 6056

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

FIRST YEAR – SUPPLEMENTARY (CBME)
PAPER II – BIOCHEMISTRY

Q.P. Code: 526056

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

Answer All Questions

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

1. A 32-year-old woman presents with vomiting and diarrhoea. Evaluation revealed acidosis. ABG analysis revealed that she presents with normal anion gap metabolic acidosis.
   a) What are plasma and urinary buffers?
   b) Which is the major plasma buffer? Why?
   c) What is anion gap?
   d) What is the clinical significance of anion gap?
   e) Why does diarrhoea present with acidosis?
   f) Why is the anion gap normal in this condition?

2. A known case of Decompensated Liver Disease (DCLD) presents with sleep disturbances and confusion. He is diagnosed with hepatic encephalopathy due to hyperammonemia.
   a) Why does DCLD cause hyperammonemia?
   b) Why does hyperammonemia cause encephalopathy?
   c) What are the non-toxic forms of ammonia?
   d) What are the causes of primary hyperammonemia?
   e) Describe in detail the biochemical steps in the formation of Ammonia.

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

1. A 65 year old man presents with back pain. On examination he is found to have multiple lytic lesions in the spine. A serum protein electrophoresis (EPP) was performed, which revealed a diagnosis of Multiple Myeloma.
   a) What is the pH of the buffer used for serum protein electrophoresis? Why?
   b) What is the band observed in serum protein electrophoresis in Multiple Myeloma? Describe.
   c) Describe the EPP pattern observed in Nephrotic syndrome.

2. The proband was a 40-year-old male was diagnosed with poorly differentiated adenocarcinoma. A family counseling revealed that the proband had five family members with colorectal cancer diagnosed before 45 years of age. As Hereditary Non Polyposis Colon Cancer (HNPCC) is suspected, all family members were counselled that this caused by a defect of DNA repair and that all family members older than 25 years should undergo regular colonoscopic examination.
   a) What are the errors that can happen in a DNA?
   b) Which is the most common error in a DNA?
   c) Which repair defect causes HNPCC?
   d) Describe in detail about the repair mechanism causative of HNPCC.

3. STATEMENT 1 : More than one codon can code for a single aminoacid.
   STATEMENT 2 : More than one aminoacids can be coded by a single codon.
   a) Which statement is true?
   b) Mention the property of genetic code, that is applicable to the true statement.
   c) What is wobble phenomenon? Explain with an example.
   d) Mention all the properties of genetic code.

4. A 11 year old boy is diagnosed with Type 1 diabetes. He was prescribed Human Biosynthetic Insulin (BHI).
   a) Mention the technology used for the synthesis of BHI.
   b) Mention the tools required for the technology.
   c) What is cDNA? How is it synthesized?

5. A 17 year old girl is diagnosed with iron deficiency anemia. She is a vegetarian and hence her nutritionist suggests her mom that her greens be given the tangy flavor using lime instead of tomato.
   a) How is heme iron absorbed along the apical side of intestine?
   b) How is non heme iron absorbed along the apical side of intestine?
   c) What is the rationale behind adding lime to greens?
   d) Describe in detail the basolateral side transport of iron.

6. A 56-year-old man, a known hypertensive presented to his family doctor with loss of appetite, weight loss, generalized weakness and lethargy of six months duration. A blood sample was taken for analysis.

   Serum : Sodium 130 mmol/L
   Potassium 5.2 mmol/L
   Bicarbonate 16 mmol/L
   Urea 258 mg/dL
   Creatinine 7.1 mg/dL
   Calcium 7.2 mg/dL
   Phosphate 8.6 mg /dL
   Albumin 2.8g /dL
   Alkaline phosphatase 205 U/L

   A diagnosis of chronic kidney disease was made
   a) Interpret serum calcium and substantiate the change observed in chronic kidney disease.
   b) Interpret and reason out potassium level alteration observed in the condition.
   c) What is the expected change in Parathormone levels in this patient? Why?

7. A 6 year old boy presents with periodic aggressive behavior. His urinary ALA is elevated. On examination, he is icteric. A mild hepatomegaly is observed. Blood examination revealed massive elevation of AFP. HPLC and TMS examination revealed elevation of succinylacetone. A diagnosis of Type I Tyrosinemia is made.
   a) What is the most probable enzyme defect?
   b) Why does he present with elevation of ALA and neuropsychiatric manifestation?
   c) Mention other Tyrosine metabolism disorders and mention the respective enzyme defects.

8. A 55-year-old person was diagnosed with Type 2 diabetes. The diabetologist asked him to get HbA1C estimated. His HbA1C was reported with a special mention that there was an abnormal migration of the hemoglobin in electrophoresis. His SpO2 was normal.
    a) What type of mutation is this?
    b) Classify mutation based on effects of mutation on nucleotide sequence, aminoacid sequence and function of protein.
    c) Give suitable examples.

9. An 8 months old male child was referred with severe transfusion dependent anemia. Complete Blood Count (CBC) showed microcytic hypochromic anemia. In view of clinical suspicion of Thalassemia major, HPLC for Hb Variant detection was performed, which revealed, HbF-23% (very high).
    a) What are the differences between Fetal hemoglobin (HbF) and adult hemoglobin (HbA)?
    b) Draw the Oxyhemoglobin Dissociation curve of HbA and HbF in a single graph.
    c) Why does fetal hemoglobin shift the oxyhemoglobin dissociation curve?

10. A 72-year-old woman from a nursing home presents to the emergency department with a change in her mental state over the past few hours. She has a medical history of hypertension and is on diuretics. Her serum sodium was 110mEq/L and serum Osmolality was 278mmol/L. On physical examination, she has decreased skin turgor, orthostatic hypotension and disorientation to time, place and person without focal neurologic deficits.
    a) What is the normal serum Sodium and Serum Osmolality?
    b) Interpret and comment on her serum sodium levels and serum Osmolatity.
    c) What are the types of Hyponatremia and give examples?
    d) Which types of Hyponatremia has the 72 year old woman presented with?

****

[MBBS 0124]