



RAN-2506000101032701 / 2406000101030701

1st MBBS Theory Examination September - 2026

Biochemistry Paper - I

સૂચના : / Instructions

- (1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fill up strictly the above details on your answer book

Seat No.:

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Student's Signature

Section A:

Q.1.

Multiple Choice Questions

(20 × 1=20)

- 1) All the following are phase I reaction, except

A) Hydrolysis	B) Conjugation
C) Reduction	D) Hydroxylation
- 2) Bronze diabetes is associated with

A) Wilson's disease	B) Hemosiderosis
C) Hemochromatosis	D) Iron deficiency anemia
- 3) One of the following disease is due to accumulation of mucopolysaccharides

A) Hunter's syndrome	B) Sanfilippo syndrome
C) Hurler's syndrome	D) All the above
- 4) Features of galactosemia include following except:

A) Cataract	B) Mental Retardation
C) Hemolytic Anemia	D) Heptaomegaly
- 5) The following substance is used to reduce intracranial pressure:

A) Sorbitol	B) Dulcitol
C) Ribitol	D) Mannitol
- 6) A child presents with exercise intolerance and chronic hemolytic anemia. Which glycolytic enzyme deficiency is the most likely cause?

A) Glucokinase	B) Phosphofructokinase
C) Pyruvate Kinase	D) Aldolase A
- 7) Which of the following is correct?

A) Tay Sach's: α galactosidase	B) Gaucher: Ceramidase
C) Niemann Pick: Sphingomyelinase	D) Fabry's : Arylsulphatase A
- 8) After 48 hours of fasting which of the following will not be active?

A) Lipolysis	B) Ketone Body Synthesis
C) Gluconeogenesis	D) Glycogenolysis
- 9) An infant born at 28 weeks gestation rapidly gave evidence of respiratory distress syndrome. Which of the following statement is true?

A) Concentration of dipalmitoyl phosphatidylcholine is expected to be lower than that of a full term baby.
B) Consequence of few type II pneumocytes
C) Case unrelated to premature death
D) L/S ratio is >2

- 10) Glycemic Index is highest for:
 - A) Fructose
 - B) Sucrose
 - C) Starch
 - D) Glucose
- 11) Absence of peroxisomes in tissues result in
 - A) Refsum's disease
 - B) SIDS
 - C) Zellweger syndrome
 - D) Methylmalonic acidemia
- 12) Calcium absorption is increased by :
 - A) Vitamin K
 - B) Vitamin B12
 - C) Vitamin D
 - D) Vitamin B1
- 13) Vitamin acts as coenzyme for the carboxylation reactions is:
 - A) Pantothenic acid
 - B) Niacin
 - C) Thiamine
 - D) Biotin
- 14) Following is the omega-3 fatty acid
 - A) Linolenic acid
 - B) Linoleic acid
 - C) Oleic acid
 - D) Arachidonic acid
- 15) Clathrin protein is associated with:
 - A) IDL
 - B) VLDL
 - C) LDL
 - D) HDL
- 16) Severe thiamine deficiency is associated with:
 - A) Decreased RBC transketolase activity
 - B) Increased clotting time
 - C) Decreased RBC transaminase activity
 - D) Increased xanthic acid excretion
- 17) 2,3-BPG is formed during _____ pathway in _____ cells
 - A) Kreb's cycle, platelets
 - B) Glycolysis, white blood
 - C) Glycolysis, lymphocytes
 - D) Glycolysis, red blood
- 18) Valinomycin inhibits oxidative phosphorylation, because:
 - A) It makes mitochondrial permeable to potassium
 - B) It inhibits cytochrome oxidase
 - C) It forms a complex with NADH
 - D) It inhibits ATP Synthase
- 19) If the product is more toxic than original compound, which of the following terms is called?
 - A) Conjugation
 - B) Detoxification
 - C) Biotransformation
 - D) Bioactivation
- 20) Liver glycogen is used in fasting to provide glucose. Muscle glycogen is not. What is the explanation for this?
 - A) Muscle does not have a debranching enzyme
 - B) Muscle cannot degrade glycogen further than glucose-1-phosphate
 - C) Muscle lacks glucose-6-phosphatase
 - D) The liver provides all the glucose necessary for metabolism and there is no need for muscle to do the same

Section B:

- Q-2. Long answer questions (Any 1 out of 2) (10 × 1= 10)**
1. Describe Glycogen metabolism (Glycogenesis and Glycogenolysis) in detail with reactions, energetic, regulation and significance. (5+2+2+1)
- OR**
2. Describe the metabolism (absorption, transport and homeostasis) of Calcium in the body. Add a note on the disorders related to calcium metabolism. (6+4)

- Q-3. Short answer questions/Justification/Biochemical Basis (Any 5 out of 6)** **(3 × 5 = 15)**
- Odd chain fatty acids can provide substrate for gluconeogenesis.
 - Vitamin E is a free radical scavenger.
 - Heparin is known as clearing factor.
 - Omega-3 fatty acids are good for health.
 - Vegans are prone for myocardial infarction.
 - Diarrhoea causes normal anion gap acidosis.

- Q-4. Short Notes (Any 3 out of 4)** **(3 × 5 = 15)**
- Glucose Transporters
 - Metabolic adaptations during fasting
 - Effect of starvation on carbohydrate and lipid metabolism in liver.
 - Significance of free radical scavenging system.

Section C:

- Q-5. Short Notes (All Compulsory)** **(4 × 5 = 20)**
- A 67 yrs old man was brought to the hospital in a semiconscious state. There was fruity smell in his breath and displayed a typical hyper ventilatory breathing pattern. Pulse was feeble and hypotension was noted. The laboratory reports were ordered and were as follows : pH: 7.24 , pCo₂: 38.0 mm Hg (35-45 mm of Hg), HCO₃⁻: 17.0 mmol/L (22-26 mmol/L), Na⁺: 135 mmol/L (135-145 mmol/L), K⁺: 6.4 mmol/L (3.5- 5.5 mmol/L), Cl⁻ 93 mmol/L (96-106 mmol/L), RBS: 487 mg/dl.
 - What acid base disorder would you expect based on this information? Justify. **(2)**
 - Calculate anion gap and write its normal range. **(1)**
 - Give the biochemical basis of fruity smell in this patient. **(1)**
 - Explain the basis of hyperkalemia in this case. **(1)**
 - HbA_{1c} with its significance
 - Fredrickson's Classification of Hyperlipoproteinaemias
 - A 45-year-old male patient reported in OPD with history of knee joint pain. On examination, physician also noticed tremors in his hands. USG of Abdomen shows hepatocellular degeneration. Slit lamp examination of eyes revealed presence of Kayser-Fleischer ring. Blood investigation revealed reduced blood ceruloplasmin levels and increased copper excretion in urine.
 - What is the probable diagnosis? Justify **(2)**
 - Write any four enzymes where copper acts as cofactor. **(2)**
 - Write down the dietary sources of copper. **(1)**

- Q-6. Short Notes (All Compulsory)** **(4 × 5 = 20)**
- Describe essential elements of communication in medical encounters.
 - Prostaglandins: Types and Clinical significance.
 - Phase-II reactions of Detoxification with examples
 - Inhibitors of Electron Transport Chain

RAN-2506000101032702 / 2406000101030702
1st MBBS Theory Examination September - 2026
Biochemistry Paper - II
Time: 3 Hours]
[Total Marks: 100
સૂચના : / Instructions

(1) ઉપરોક્ત દર્શાવેલ વિગતો ઉત્તરવહી પર અવશ્ય લખવી.

Fill up strictly the above details on your answer book

Seat No.:

Student's Signature

Section A
Q.1.
Multiple Choice Questions
(20 × 1=20)

- 1) Which plasma protein is mainly responsible for maintaining oncotic pressure?
 - A) Globulin
 - B) Fibrinogen
 - C) Albumin
 - D) Prothrombin
- 2) Which of the following scenarios with a diagnosis of chronic liver disease?
 - A) Decreased Albumin, Normal PT
 - B) Decreased Albumin, Increased PT
 - C) Normal Albumin, Increased PT
 - D) Increased Albumin, Normal PT
- 3) A 67-year-old man presented to the emergency department with a 1 week history of angina and shortness of breath. He complained that his face and extremities had a "blue color." His medical history included chronic stable angina treated with isosorbide dinitrate and nitroglycerin. Blood obtained for analysis was chocolate-colored. Which one of the following is the most likely diagnosis?
 - A) Sickle cell anemia
 - B) Carboxyhemoglobinemia
 - C) Methemoglobinemia
 - D) β -Thalassemia
- 4) A patient present with jaundice, abdominal pain and nausea. Lab report shows: increased plasma conjugated bilirubin, urinary bilirubin present & urinary urobilinogen absent. What is the cause of jaundice?
 - A) Decreased hepatic conjugation of bilirubin
 - B) Decreased secretion of bile into intestine
 - C) Decreased hepatic uptake of bilirubin
 - D) Increased hemolysis
- 5) Tumor markers for ovarian cancer are
 - A) Beta-hcG
 - B) AFP
 - C) CA-125
 - D) CEA
- 6) The following compound is not a polyamine
 - A) Ethanolamine
 - B) Spermine
 - C) Putrescine
 - D) Spermidine
- 7) UGA is stop codon in cytoplasm, whereas in mitochondria it codes for
 - A) Isoleucine
 - B) Tryptophan
 - C) Methionine
 - D) Arginine

- 8) The ratio between the distance travelled by substance and the distance travelled by a solvent front is known as
 A) Rf value
 B) Rs value
 C) pI point
 D) None of the above
- 9) Hormone - receptor complex binds to DNA at
 A) Promoter element
 B) CAAT box
 C) HRE (Hormone Response Elements)
 D) TATA box
- 10) 33 year old women presented with abdominal pain & behavioral symptoms. She developed autonomic instability and respiratory failure. On examination, there was loss of sensory and motor responses with no history of photo sensitivity. Lab findings were increased urinary porphobilinogen levels and ALA. She was diagnosed with Acute intermittent porphyria. Which enzyme is deficient?
 A) Uroporphyrinogen III synthase
 B) ALA synthase
 C) ALA dehydratase
 D) Hydroxymethylbilane synthase
- 11) All the following proteins are associated with only eukaryotic replication except
 A) Replication protein A
 B) Replication factor C
 C) Proliferating cell nuclear antigen
 D) Single stranded binding proteins
- 12) The region -10 bp (upstream) to the transcription initiation site in bacterial cells is called
 A) Pribnow box
 B) CAAT box
 C) HRE
 D) Hogness box
- 13) Organophosphorus poisoning diagnosis depends on:
 A) Estimation of cholinesterase
 B) Estimation of Mercury
 C) Estimation of choline
 D) Estimation of acetylcholinesterase
- 14) All statements regarding Gamma globulins are correct except
 A) Synthesized by hepatocytes
 B) Synthesized by immune cells
 C) Forms antibodies
 D) Immunoglobulins
- 15) The enzyme that produces single stranded nicks in DNA
 A) DNA Polymerase I
 B) DNAase I
 C) DNA ligase
 D) Polynucleotide kinase
- 16) Which is true regarding amino acids?
 A) Alanine is ketogenic
 B) Glycine is ketogenic
 C) Branched chain amino acids are catabolized primarily in the liver
 D) Cysteine is essential for individuals consuming diet deficient in methionine
- 17) Which of the following enzymes are used as a markers of hepatocellular injury
 A) ALP & GGT
 B) ALT & AST
 C) LDH & CK
 D) Both A & B
- 18) Which of the following pairs correctly matches a biogenic amine with its precursor amino acid?
 A) Melatonin-Tryptophan
 B) GABA-Tyrosine
 C) Histamine - Glutamate
 D) Norepinephrine-Tryptophan
- 19) Which of the following molecules links the Urea Cycle to the Tricarboxylic Acid (TCA) Cycle?
 A) Oxaloacetate
 B) Succinyl-CoA
 C) Fumarate
 D) Acetyl-CoAs
- 20) Which one of the following enzymes of nucleotide metabolism is correctly paired with its pharmacologic inhibitor?
 A) Thymidylate synthase - allopurinol
 B) Xanthine oxidase - probenecid
 C) Ribonucleotide reductase - 5-Fluorouracil
 D) Dihydrofolate reductase - methotrexate

Section B

- Q-2. Long answer questions (Any 1 out of 2)** (10 × 1 = 10)
Explain the formation and fate of Ammonia in detail with disorders. (6+4)
OR
Describe coenzymes and isoenzymes with examples. Write diagnostic (2+2+6) and therapeutic applications of enzymes.
- Q-3. Short answer questions/Justification/Biochemical Basis (Any 5 out of 6)** (3 × 5 = 15)
- Name any three multi-enzyme complexes.
 - Name any two diseases cured by Gene Therapy.
 - Transamination and deamination.
 - G-protein coupled receptors form second messenger system.
 - Nucleotide analogues are important anticancer drugs.
 - What is Levey-Jennings chart? Explain.
- Q-4. Short Notes (Any 3 out of 4)** (3 × 5 = 15)
- Biologically important nucleotides
 - Applications of Recombinant DNA Technology
 - Urea cycle disorders
 - Post translational modifications

Section C

- Q-5. Short Notes (All Compulsory)** (4 × 5 = 20)
- a. A 2-month-old male infant was brought to the pediatric outpatient department by his parents because of very light skin, white hair, and light-colored eyebrows and eyelashes since birth. The parents also noticed that the baby was sensitive to bright light and had rapid involuntary eye movements (nystagmus). On examination, the infant had marked hypopigmentation of the skin, hair, and iris, with reduced visual acuity. There were no abnormalities of other organs, and the baby's growth and development were normal. The family history revealed that the paternal grandfather had similar features.
- What is the probable diagnosis? Justify (1)
 - Explain the biochemical basis of generalized hypopigmentation and photophobia? (2)
 - Explain the biochemical pathway for melanin synthesis (2)
- b. Alkaptonuria
- c. Gout
- d. A 10-year-old boy from a tribal village was brought to the Department of Pediatrics with a history of jaundice, normocytic anemia, and recurrent episodes of acute bone pain. On investigation, he was found to have a low hemoglobin level (6.5 g/dL). A peripheral blood smear revealed numerous sickle cells, and he was diagnosed with sickle cell anemia.
- Explain the biochemical basis of this case. (2)
 - Which are the investigations used to diagnose this condition? (1)
 - Write a note on different types of hemoglobin variants. (2)

Q-6.

Short Notes (All Compulsory)

- a. Role of a physician to society and community
 - b. Oncogenes and Tumor Suppressor Genes
 - c. Classify mutations with examples
 - d. Principle and steps of PCR.
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