



RAN-2006000101030001

**RAN-2006000101030001**

**1st MBBS Examination November - 2023**

**Biochemistry : Paper - I**

**Set - 1**

**Time: 3 Hours ]**

**[ Total Marks: 100**

**સૂચના : / Instructions**

(1)

નીચે દર્શાવેલ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.  
Fill up strictly the details of signs on your answer book

Name of the Examination:

1st MBBS

Name of the Subject :

Biochemistry : Paper - I - Set - 1

Subject Code No.: 2006000101030001

Seat No.:

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Student's Signature

- (2) All questions are compulsory
- (3) Each MCQ has only one correct answer
- (4) One mark for correct answer. No negative marking.

**Section - A : MCQ**

**20 Marks**

1. The subcellular organelle known as 'Suicidal bag' is :
  - a) Peroxisome
  - b) Lysosome
  - c) Centrosome
  - d) Nucleosome
2. Membrane lipids constitute:
  - a) Phospholipids
  - b) Sphingolipids
  - c) Cholesterol
  - d) All of the above
3. The glycosaminoglycan found in synovial fluid is:
  - a) Hyaluronic acid
  - b) Heparin
  - c) Heparan sulphate
  - d) Keratan sulphate
4. Which of the following carbohydrate(s) is/are not digested by humans?
  - a) Cellulose
  - b) Hemicellulose
  - c) Pectin
  - d) All of the above

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5. The coenzyme of transketolase is :
  - a) TPP
  - b) PLP
  - c) NAD<sup>+</sup>
  - d) Biotin
  
6. Accumulation of sorbitol in tissue leads to :
  - a) Cataract formation
  - b) Peripheral neuropathy
  - c) Nephropathy
  - d) All of the above
  
7. Which of the following is Poly unsaturated fatty acid?
  - a) Palmitic acid
  - b) Palmitoleic acid
  - c) Linoleic acid
  - d) Oleic acid
  
8. The transport form of dietary lipids is :
  - a) Chylomicrons
  - b) Fatty acids
  - c) Monoacylglycerol
  - d) Triacylglycerol
  
9. Rate limiting step of fatty acid synthesis is :
  - a) Acetyl CoA carboxylase
  - b) Glycerol kinase
  - c) Hormone sensitive lipase
  - d) Co-lipase
  
10. The apolipoprotein specific for LDL is :
  - a) Apo B 100
  - b) Apo B 48
  - c) Apo C I
  - d) Apo C II
  
11. Acetyl CoA metabolite is derived from :
  - a) Carbohydrates
  - b) Proteins
  - c) Lipids
  - d) All of the above
  
12. Reference range of Serum total calcium is :
  - a) 8.5 – 10.5 mg/dL
  - b) 8.5 – 10.5 gm/dL
  - c) 8.5 – 10.5 mg/L
  - d) 8.5 – 10.5 gm/L
  
13. Hormone involved in uncoupling of oxidative phosphorylation is :
  - a) Insulin
  - b) Thyroxine
  - c) Epinephrine
  - d) All of the above
  
14. The principal anion of ECF is :
  - a) Chloride
  - b) Bicarbonate
  - c) Protein
  - d) Phosphates

15. Total pCO<sub>2</sub> is increased in :
- a) Respiratory acidosis                      b) Metabolic alkalosis  
c) Metabolic acidosis                         d) Respiratory alkalosis
16. Proteinuria is defined as :
- a) ≥ 50 mg/day protein in urine  
b) ≥ 100 mg/day protein in urine  
c) ≥ 150 mg/day protein in urine  
d) ≥ 200 mg/day protein in urine
17. Parameter(s) assessed to test the synthetic function of liver :
- a) Prothrombin                                      b) Ceruloplasmin  
c) α<sub>1</sub>-Antitrypsin                                 d) All of the above
18. The RDA for proteins is :
- a) 15 - 25gm/Kg/day                              b) 0.75 - 0.8 gm/Kg/day  
c) 0.2 - 0.4 gm/Kg/day                         d) 5 - 10 gm/Kg/day
19. Cytochrome P450 is involved in detoxification by :
- a) Hydrolysis                                        b) Oxidation  
c) Conjugation                                      d) Reduction
20. The following are the characteristics of free radicals, EXCEPT :
- a) Highly reactive  
b) Short half-life  
c) Cytotoxic  
d) Not produced during normal metabolism

**Section - B**

**40 Marks**

**Instructions for section B and C :**

- (1) Use blue/black ball point pen only.  
(2) The numbers to the right indicates full marks.  
(3) Draw diagrams wherever necessary.

**Q. 2. Long Answer Questions. (ANY TWO) (2 × 10 = 20)**

- A. Discuss source, RDA, metabolism (absorption, transport, and storage) and functions of Iron. Add a note on various anemias related to iron deficiency and overload. (1 + 1 + 3 + 2 + 3 = 10)

B. Explain beta-oxidation of 16 carbon atom saturated fatty acid. How it is regulated? Explain how many ATPs are synthesized? (6 + 2 + 2)

C. Define glycogenesis and glycogenolysis. Write the reactions of glycogenesis and glycogenolysis in liver, Add a note on Glycogen storage disorders. (2 + 5 + 3)

**Q. 3. Write Brief Answer / Justifications / Biochemical basis. (ANY TEN)**  
(10 × 2 = 20)

- a) Glucose is required for the absorption of Na<sup>+</sup>.
- b) Muscle glycogen cannot contribute to blood glucose level.
- c) Respiratory Distress Syndrome (RDS) is observed in premature babies.
- d) HDL cholesterol is good cholesterol.
- e) In uncontrolled diabetes mellitus cataract is developed at early age
- f) Aspirin is used as anti-inflammatory drug.
- g) Brain cannot utilise fatty acid for energy purpose.
- h) Inhibitors of ETC?
- i) Why there is oedema in protein malnutrition?
- j) Blood is collected in fluoride bulb for estimation of blood glucose level.
- k) Examples of ketone bodies and functions (any two).

**Section - C**

**40 Marks**

**Q. 4. Short answer questions. (ANY FOUR)** (4 × 5 = 20)

- A. Renal Function Test.
- B. Outline doctor patient communication. Add a short answer on components of communication in medical encounters.
- C. Protein Energy Malnutrition (PEM).
- D. Detoxification reactions.
- E. Complications of Diabetes mellitus.

**Q. 5. Clinical cases. (All compulsory)**

**(10 × 2 = 20)**

**Case - 1:**

A 65 year old man was brought to the hospital in a semiconscious state. The patient displayed a typical hyperventilatory breathing pattern with fruity smell in his breath. The pulse was feeble and hypotension was noted. The laboratory reports were ordered and were as below:

pH: 7.10, pCO<sub>2</sub> 39.0 mm of Hg, HCO<sub>3</sub><sup>-</sup> : 14.0 mmol /L,  
Serum Na<sup>+</sup>: 135.5 mmol /L, K<sup>+</sup>: 6.5mmol/L, Cl<sup>-</sup> : 90mmol/L,  
Random Blood Sugar : 451 mg/dl.

- 1) Identify the acid base disorder in above case with justification?
- 2) Calculate Anion Gap. Give any 2 causes of High Anion Gap Metabolic Acidosis.
- 3) Give biochemical basis of 'fruity smell' in this patient.
- 4) Explain the basis of hyperkalemia in this case.
- 5) Mention normal serum values for pH & blood gases.

**Case - 2:**

A 40-year man consulted an ophthalmologist to obtain a prescription for reading glasses. The ophthalmologist noticed that the patient had bilateral arcus senilis and recommended to consult physician. Physician noticed that he also had tendon xanthomata arising from Achilli's tendons. Family history revealed his father had died of heart attack at the age of 40. An ECG taken at rest was normal but ischemic changes developed on exercise. Analysis of fasting blood for lipids showed the following :

Parameter	Patient's results	Normal range
Total cholesterol	530 mg/dL	< 200 mg/dl
Serum triglycerides	110mg/dL	< 150 mg/dl
LDL cholesterol	440 mg/dL	< 130 mg/dl
HDL cholesterol	64 mg/dL	> 60 mg/dl

1. This patient is suffering from which type of hyperlipidemia?
2. What is the possible cause of this condition?
3. Justify- LDL is termed as bad cholesterol.
4. What are the apo proteins? Mentions its functions.
5. Write down the important functions of cholesterol.



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**1<sup>st</sup> MBBS (Biochemistry) Examination November - 2023**

**Biochemistry : Paper - II**

**Set - 2**

**Time: 3 Hours ]**

**[ Total Marks: 100**

**सूचना : / Instructions**

(1)

नीचे दशविले निशानीवाणी विगतो उत्तरवही पर अवश्य लखवी.  
Fill up strictly the details of signs on your answer book

Name of the Examination:

1<sup>st</sup> MBBS (Biochemistry)

Name of the Subject :

Biochemistry : Paper - II - Set - 2

Subject Code No.: 2006000101030002

Seat No.:

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Student's Signature

- (2) All questions are compulsory.
- (3) Each MCQ has only one correct answer.
- (4) One mark for correct answer. No negative marking.

**Section - A : MCQ**

**20 Marks**

1. Gout is characterized by increased plasma levels of
  - a. Urea
  - b. Uric acid
  - c. Creatine
  - d. Creatinine
2. Lesch-Nyhan syndrome, the sex linked recessive disorder is due to the lack of the enzyme :
  - a. Hypoxanthine-guanine phosphoribosyl transferase
  - b. Xanthine oxidase
  - c. Adenine phosphoribosyl transferase
  - d. Adenosine deaminase
3. Which of the following vitamins act as a strong reducing agent?
  - a. Folic acid
  - b. Tocopherol
  - c. Ascorbic acid
  - d. Pantothenic acid

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4. The anti-egg white injury factor is:
- a. Avidin
  - b. Choline
  - c. Biotin
  - d. Isoniazid
5. Immunoglobulin present in body secretion is:
- a. Ig M
  - b. Ig D
  - c. Ig E
  - d. Ig A
6. The number of amino acids in antidiuretic hormone is
- a. 9
  - b. 18
  - c. 27
  - d. 36
7. A non-functional plasma enzyme is
- a. Pseudocholinesterase
  - b. Lipoprotein lipase
  - c. Proenzyme of blood coagulation
  - d. Alanine Transaminase
8. In competitive enzyme inhibition :
- a. The structure of inhibitor generally resembles that of the substrate
  - b. Inhibitor decreases apparent  $K_m$
  - c.  $K_m$  remains unaffected
  - d. Inhibitor decreases  $V_{max}$  without affecting  $K_m$
9. Niacin is synthesized in the body from :
- a. Tryptophan
  - b. Tyrosine
  - c. Glutamate
  - d. Aspartate
10. Vitamin K serves as a coenzyme in reaction that result in the modified activity of several enzymes of blood coagulation cascade. Which of the following amino acid modifications requires the activity of vitamin K?
- a. Aspartate to  $\beta$ -carboxyaspartate
  - b. Glutamate to  $\gamma$ -carboxyglutamate
  - c. Lysine to hydroxylysine
  - d. Lysine to  $\beta$ -methyl lysine

11. Isoenzymes can be characterized by :
- Proteolytic enzymes activated by hydrolysis
  - Enzymes with identical primary structure
  - Similar enzymes that catalyse different reaction
  - Chemically, immunologically and electrophoretically different forms of an enzyme
12. Pyrimidine Dimers are seen in :
- Gout
  - Xeroderma pigmentosa
  - Lesch Nyhan Syndrome
  - Mutation by alkylating agents
13. The most of the ultraviolet absorption of proteins above 240 nm is due to their content of :
- Tryptophan
  - Aspartate
  - Glutamate
  - Alanine
14. Sakaguchi's reaction is specific for
- Tyrosine
  - Proline
  - Arginine
  - Cysteine
15. Magenta tongue is found in the deficiency of the vitamin :
- Riboflavin
  - Thiamine
  - Nicotinic acid
  - Pyridoxine
16. In brain, the major metabolism for removal of ammonia is the formation of
- Glutamate
  - Aspartate
  - Asparagine
  - Glutamine
17. The sparing action of methionine is :
- Tyrosine
  - Cystine
  - Arginine
  - Tryptophan
18. Which of the following plasma protein prevents loss of hemoglobin in Urine?
- Haptoglobin
  - Albumin
  - Transferrin
  - Hemopexin



19. Following are the applications of Polymerase Chain Reaction (PCR), EXCEPT :
- Prenatal diagnosis and carrier detection
  - Splicing of DNA
  - Forensic analysis of DNA samples
  - Detection of Viral and bacterial infections
20. The two nitrogens of the pyrimidine ring are contributed by
- Ammonia and glycine
  - Aspartate and carbamoyl phosphate
  - Glutamine and ammonia
  - Aspartate and ammonia

**Section - B**

**40 Marks**

**Instructions for section B and C :**

- Use blue/black ball point pen only.
- The numbers to the right indicates full marks.
- Draw diagrams wherever necessary

**Q. 2. Long Answer Questions. (ANY TWO) (2 x 10 = 20)**

- Describe the process of replication of DNA in a prokaryotic cell. What are different types of mutations? Write a note on different DNA repair mechanisms. (5 + 3 + 2)
- Describe the Catabolism of heme. Add a note on hyperbilirubinemias. (5 + 5)
- Describe primary and secondary structure of protein with example. Add a note on functions of plasma proteins. (6 + 4)

**Q. 3. Write Brief Answer / Justifications / Biochemical basis. (ANY TEN) (10 x 2 = 20).**

- Adenosine deaminase deficiency cause severe combined immuno-deficiency disorder.
- Mention 4 biochemical functions of Albumin
- Vitamin D Acts as a hormone. Justify.
- Biologically important peptides.
- Write down two clinical applications of ELISA
- Blue fluorescent light is used in the treatment of neonatal jaundice.

- g) Blood urea levels depletes in liver disease. Justify.
- h) Post-transcriptional modifications
- i) Telomerase inhibitors can be use in treatment of malignancy,
- j) Functions of vitamin C (any four).
- k) Zwitter ions have least buffering & amp; solubility capacity.

**Section - C**

**40 Marks**

**Q. 4. Short answer questions. (ANY FOUR)**

**(4 × 5 = 20)**

- a) Diagnostic applications of enzymes.
- b) Gout.
- c) Tumor markers.
- d) Vitamin A: Functions and Deficiency disorders.
- e) Recombinant DNA technique.

**Q. 5. Clinical Cases. (ALL COMPULSORY)**

**(10 × 2 = 20)**

**Case - 1 :**

A 55-year-old man attended OPD with complaints of pain in lower limbs, generalized fatigue for last 4 months. He was vegetarian by diet. His laboratory investigations showed low Vitamin B<sub>12</sub> levels, elevated Homocysteine level and normal folate level. Peripheral smear shows macrocytic anemia. Physician prescribed the vitamin B<sub>12</sub> injection and symptoms were improved.

1. Enumerate causes of vitamin B<sub>12</sub> deficiency. What is a daily requirement of vitamin B<sub>12</sub> for adult?
2. What is folate trap?
3. Why increased homocysteine level leads to cardiovascular problem?
4. Mentioned the Coenzyme form of vitamin B<sub>12</sub>. Write reactions catalyzed by each of them.
5. Why vitamin B<sub>12</sub> deficiency leads to macrocytic anemia and neurological symptoms?

**Case - 2 :**

52 years old patient was admitted to the casualty department of hospital in a serious condition. He had become increasingly depressed after the death of his wife. His daughter found him in an unconscious state when she had come to see him in the morning. One and a half empty bottles of alcohol were found in the room. When the alcohol was examined for its contents, it was found to be containing high amount of methanol. Doctors on duty diagnosed that it was a case of methanol intoxication and decided to start treatment with ethanol.

1. Enumerate various classes of enzymes. Which class of enzymes is required to metabolize alcohols?
2. Why methanol is toxic?
3. Explain ethanol is used in the treatment of methanol poisoning.
4. Enumerate salient differences between competitive and non competitive inhibition.
5. Why in competitive inhibition  $K_m$  is increased but  $V_{max}$  is not affected?