

## M.B.B.S. FIRST PROFESSIONAL EXAMINATION, APRIL/MAY-2021

## BIOCHEMISTRY

## PAPER - FIRST

[Time allotted: Three hours]

SET - A

[Max Marks: 100]

Q. 1. Multiple choice questions (attempt all MCQs in the allotted first 20 minutes in the OMR sheet) (1 x 20 = 20)

1. Peroxisomes are:
  - a. The site of biological oxidation
  - b. The site of post-translational modifications
  - c. Concerned with drug detoxification
  - d. Involved in the production of free radicals
2. An enzyme that catalyzes the conversion of an aldose to a ketose would be classified as:
  - a. Transferases
  - b. Isomerases
  - c. Oxidoreductases
  - d. Hydrolases
3. Which of the following is not a component of innate immunity?
  - a. Antibacterial antibodies
  - b. Neutrophils
  - c. Skin
  - d. Macrophages
4. Gene amplification can be achieved by:
  - a. Southern blotting
  - b. DNA fingerprinting
  - c. Polymerase chain reaction
  - d. Gene cloning
5. Frameshift mutation results from:
  - a. Substitution of a single base
  - b. Deletion of a single base
  - c. Addition of a codon
  - d. Deletion of a codon
6. Urine of a patient with acute intermittent porphyria is likely to contain:
  - a. Porphobilinogen
  - b. Uroporphyrinogen
  - c. Protoporphyrinogen
  - d. Bilirubin
7. An uncoupler of oxidative phosphorylation such as dinitrophenol:
  - a. Inhibits electron transport and ATP synthesis
  - b. Allows electron transport to proceed without ATP synthesis
  - c. Inhibits electron transport without affecting ATP synthesis
  - d. Specifically inhibits cytochrome b
8. The method employed in the analysis of products of polymerase chain reaction is:
  - a. Isoelectric focusing
  - b. Immunoelectrophoresis
  - c. Capillary electrophoresis
  - d. PAGE
9. The enzyme responsible for preventing super coiling of DNA, produced during unwinding of DNA in replication is:
  - a. Helicase
  - b. Primase
  - c. Topoisomerase
  - d. Ligase
10. Peptidyl transferase activity of 50 S RNA is inhibited by:
  - a. Rifampicin
  - b. Cycloheximide
  - c. Chloramphenicol
  - d. Erythromycin
11. Hyperuricemia can result from defect in all of the following enzymes except:
  - a. Carbamoyl phosphate synthetase II
  - b. HGPRTase
  - c. PRPP synthase
  - d. Glucose-6-phosphatase
12. All of the following are important in determination of the primary structure of a protein except:
  - a. Determination of the  $\alpha$ -helical structure of protein
  - b. Separation of different polypeptide chains.
  - c. Determination of the amino acid sequence in peptide fragments
  - d. Determination of the number of polypeptide chains
13. A competitive inhibitor of an enzyme:
  - a. Increases  $K_m$  without affecting  $V_{max}$
  - b. Decreases  $K_m$  without affecting  $V_{max}$
  - c. Increases  $V_{max}$  without affecting  $K_m$
  - d. Decreases  $V_{max}$  without affecting  $K_m$
14. Immunoglobulin classes are differentiated from each other on the basis of difference in their:
  - a. Electrophoretic mobility
  - b. Molecular weight
  - c. Light chains
  - d. Heavy chains
15. The beneficial effects of dietary fiber include all of the following except:
  - a. Increased motility of intestine
  - b. Helping in the digestion process
  - c. Decreased absorption of cholesterol
  - d. Increased glucose tolerance
16. The amino acid containing guanidine group is:
  - a. Arginine
  - b. Histidine
  - c. Tyrosine
  - d. Tryptophan
17. All of the following are nucleotides except:
  - a. Adenosine triphosphate
  - b. Phosphoadenosine phospho sulphate
  - c. S-adenosyl methionine
  - d. Nicotinamide adenine dinucleotide
18. Acetyl-CoA is used for the production of all the following, except:
  - a. Oxidation in TCA cycle
  - b. De novo synthesis of fatty acid
  - c. Glucose
  - d. Cholesterol
19. Starvation activates all the enzymes, except:
  - a. Alanine amino transferase
  - b. Carnitine acyltransferase
  - c. HMG-CoA lyase
  - d. ATP citrate lyase
20. Which of the intermediates listed is a dicarboxylic hydroxy acid?
  - a. Succinate
  - b. Fumarate
  - c. Malate
  - d. Oxaloacetate

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**Note:** Attempt all questions.  
Draw suitable diagrams (wherever necessary)

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- Q. 2. Give reasons:** (2 x 5 = 10)
- Dihydrofolate reductase deficiency may manifest as phenylketonuria.
  - Erythropoietic porphyria patients are photosensitive.
  - Mono-oxygenases are called "hydroxylases".
  - Quality of protein in diet is more important than its quantity.
  - At any time, only one class of immunoglobulin is synthesized against an antigen.
- Q. 3. Problem based question:** (2 x 5 = 10)
- A patient presented with recurrent urolithiasis, hematuria and associated recurrent UTI. On renal stone analysis cystine stones were detected. Chromatography and electrophoresis were done on the urine sample to study the amino acid excretion pattern.
- What is the probable diagnosis?
  - What is the biochemical basis of this defect?
  - Which other dibasic amino acids are excreted in the urine?
  - Name two important compounds formed from cysteine.
  - How is cysteine synthesized from homocysteine?
- Q. 4. Write briefly on:** (6 x 4 = 24)
- Applications of recombinant DNA Technology
  - Causes of Hyperbilirubinemia
  - Lac operon model of gene expression
  - Doctor and patient relationship
- Q. 5. Structured questions:**
- (i) Describe isoenzymes with two suitable examples. Write the importance of serum enzymes in diagnosis of liver disease. (5+5= 10)
- (ii) Describe the process of DNA replication. Add a note on gene mutation. (6+4= 10)
- Q. 6. Answer as indicated:** (4 x 4 = 16)
- Explain Urea cycle in a flowchart
  - Specific Dynamic Action (SDA) and its significance
  - Multiple Myeloma
  - Primary and secondary causes for Gout

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[Time allotted: Three hours]

SET - A

[Max Marks: 100]

Q. 1. Multiple choice questions (attempt all MCQs in the allotted first 20 minutes in the OMR sheet) (1 x 20 = 20)

1. Following is an example of homopolysaccharide:
  - a. Heparin
  - b. Hyaluronic acid
  - c. Keratan sulphate
  - d. Chitin
2. Uronic acid is absent in following GAG:
  - a. Keratan sulphate
  - b. Dermatan sulphate
  - c. Hyaluronic Acid
  - d. Heparan sulphate
3. CA-125 is a tumor marker for:
  - a. Ovarian cancers
  - b. Hepatocellular carcinoma
  - c. Colorectal cancer
  - d. Cancer of the prostate
4. Which vitamin act as a co-enzyme for acetyl CoA carboxylase:
  - a. Biotin
  - b. PLP
  - c. Niacin
  - d. Thiamine
5. Respiratory distress syndrome in premature infants is due to the deficiency of:
  - a. Plasmalogen
  - b. Dipalmitoyl lecithin
  - c. Cardiolipin
  - d. Cephalin
6. Refsum's disease result from a defect in the following pathway:
  - a.  $\omega$ -oxidation of fatty acid
  - b.  $\beta$ -oxidation of fatty acid
  - c.  $\gamma$ -oxidation of fatty acid
  - d.  $\alpha$ -oxidation of fatty acid
7. Reliable index for serum osmolality is:
  - a. Plasma sodium
  - b. Plasma potassium
  - c. Plasma proteins
  - d. Plasma glucose
8. All the following substances serve as precursors for gluconeogenesis, except:
  - a. Lactate
  - b. Propionyl CoA
  - c. Pyruvate
  - d. Leucine
9. All steroid hormones are formed from:
  - a. Cholesterol
  - b. Purines
  - c. Glycerol
  - d. Protein
10. Burning foot syndrome is due to deficiency of:
  - a. Pantothenic acid
  - b. Biotin
  - c. Riboflavin
  - d. Niacin
11. Detoxification by hydroxylation is:
  - a. Phase I reaction
  - b. Phase II reaction
  - c. Phase III reaction
  - d. Both I and II
12. The following molecule is considered to be the common metabolic end product of carbohydrates, lipids and proteins:
  - a. Pyruvate
  - b. Succinyl CoA
  - c. Acetyl CoA
  - d. Lactate
13. Detoxification of sulfanilamide is an example of:
  - a. Acetylation
  - b. Oxidation
  - c. Conjugation with glycine
  - d. Hydrolysis
14. Estrogen receptors are seen in:
  - a. Microsomes
  - b. Peroxisomes
  - c. Nucleus
  - d. Mitochondria
15. Co-enzyme for Methyl Malonyl CoA isomerase:
  - a. Vitamin B<sub>12</sub>
  - b. Folic acid
  - c. Biotin
  - d. Riboflavin
16. Criteria to diagnose pre-diabetes:
  - a. Fasting blood sugar – 100 - 125 mg/dl
  - b. Fasting blood sugar – >100 mg/dl
  - c. Postprandial blood sugar – 70 - 140 mg/dl
  - d. Postprandial blood sugar – >200 mg/dl
17. Ketogenesis is:
  - a. Mitochondrial
  - b. Cytoplasmic
  - c. Both mitochondrial and cytoplasmic
  - d. Peroxisomal
18. Which of the following factor stimulate renin release?
  - a. Prostaglandin inhibitor
  - b. Increased blood pressure
  - c. Salt intake
  - d. Salt depletion
19. Which of the following mineral is necessary for tyrosinase activity?
  - a. Iron
  - b. Copper
  - c. Iodine
  - d. Zinc
20. Microalbuminuria is identified when..... albumin is excreted in urine.
  - a. 30-300 gm/day
  - b. 30-300 mg/dl
  - c. 30-300 mg/day
  - d. 30-300 mg/dl

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**Note:** Attempt all questions.  
Draw suitable diagrams (wherever necessary)

- Q. 2. Give reasons:** (2 x 5 = 10)
- Lactic acidosis in von-Geirke's disease
  - Use of statin drugs in treatment of hypercholesterolemia
  - Methotrexate is used as an anticancer drug
  - Defect in beta oxidation causes hypoglycemia
  - Role of warfarin as anticoagulant drug
- Q. 3. Problem based question:** (2 x 5 = 10)
- A 50 years old male patient was brought to emergency in unconscious state. He has a history of consumption of excess alcohol on a regular basis since last 25 years. On examination, he has distended abdomen and yellow sclera. On blood investigation, blood glucose level was found to be 52 mg/dl. Results of various serum tests were:
- AST- 380 IU/L, ALT - 170 IU/L, GGT- 155 IU/L, ALP-170 IU/L  
Serum total bilirubin - 6.9 mg/dL
- What is the most probable diagnosis? Why the patient is hypoglycemic?
  - Write the normal ranges of AST, ALT, ALP & total bilirubin?
  - Write the significance of GGT estimation in this condition.
  - Write the normal levels of blood glucose in fasting and postprandial state?
  - Enumerate the two other causes for hypoglycemia?
- Q. 4. Write briefly on:** (6 x 4 = 24)
- Biochemical role of vitamins in the prevention of anaemia
  - Significance of HMP shunt pathway
  - Cancer- A multifactorial disease
  - What are the rights of a patient?
- Q. 5. Structured questions:**
- Draw a labelled diagram of Lipoproteins. Explain metabolism of chylomicrons in blood. Give an account on role of LDL in atherosclerosis. (10)
  - Describe the various mechanisms by which are responsible for maintenance of pH of body fluid. Write a note on role of ADH in water balance. (10)
- Q. 6. Answer as indicated:** (4 x 4 = 16)
- Illustrate the Pyruvate dehydrogenase complex
  - Explain Iron absorption through labelled diagram
  - Explain mechanism of cytochrome P-450
  - Figure mechanism of thyroid hormones