



KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH

Biochemistry Paper 1 [BIO1]

Marks: 100

Duration: 180 mins.

MCQ 20 X 1 = 20

Answer all the questions.

Section Duration: 30 mins

1			Hartnup's disease results from defect in transport mechanism for							(1)								
<table border="1"> <tr> <td>1) Nucleic acids</td> <td></td> <td>2) Amino acids</td> <td></td> <td>3) Carbohydrates</td> <td></td> <td>4) Lipids</td> <td></td> </tr> </table>											1) Nucleic acids		2) Amino acids		3) Carbohydrates		4) Lipids	
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2			"Inclusion cell disease" is a condition due to defective functioning of							(1)								
<table border="1"> <tr> <td>1) Nucleolus</td> <td></td> <td>2) Mitochondria</td> <td></td> <td>3) Lysosomes</td> <td></td> <td>4) Endoplasmic reticulum</td> <td></td> </tr> </table>											1) Nucleolus		2) Mitochondria		3) Lysosomes		4) Endoplasmic reticulum	
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3			A 25-year-old female was taking warfarin (anticoagulant) for last 6 months after her diagnosis of cavernous sinus thrombosis. She now presents with increased coagulation and prothrombin time. Vitamin K injection was advised. What is the rationale behind use of vitamin K.							(1)								
<table border="1"> <tr> <td>1) Vitamin K competitively inhibits action of warfarin.</td> <td></td> <td>2) Vitamin K non competitively inhibits action of warfarin</td> <td></td> <td>3) Vitamin K uncompetitively inhibits action of warfarin.</td> <td></td> <td>4) Vitamin K causes suicide inhibition of the enzyme.</td> <td></td> </tr> </table>											1) Vitamin K competitively inhibits action of warfarin.		2) Vitamin K non competitively inhibits action of warfarin		3) Vitamin K uncompetitively inhibits action of warfarin.		4) Vitamin K causes suicide inhibition of the enzyme.	
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4			Following is an example of hydrogen transferring coenzyme							(1)								
<table border="1"> <tr> <td>1) CoA</td> <td></td> <td>2) NAD⁺</td> <td></td> <td>3) Biotin</td> <td></td> <td>4) TPP</td> <td></td> </tr> </table>											1) CoA		2) NAD ⁺		3) Biotin		4) TPP	
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5			Following enzyme is used in diagnosis of acute pancreatitis							(1)								
<table border="1"> <tr> <td>1) Alkaline phosphatase</td> <td></td> <td>2) Acid phosphatase</td> <td></td> <td>3) Aldolase</td> <td></td> <td>4) Amylase</td> <td></td> </tr> </table>											1) Alkaline phosphatase		2) Acid phosphatase		3) Aldolase		4) Amylase	
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6			A patient with type 1 diabetes mellitus takes an insulin injection before eating dinner but then gets distracted and does not eat. Approximately 3 hours later, the patient becomes shaky, sweaty and confused. These symptoms have occurred because of which of the following?							(1)								
<table border="1"> <tr> <td>1) Decreased blood levels of cortisol</td> <td></td> <td>2) Decreased glucagon release from the pancreas</td> <td></td> <td>3) High blood glucose levels</td> <td></td> <td>4) Low blood glucose levels</td> <td></td> </tr> </table>											1) Decreased blood levels of cortisol		2) Decreased glucagon release from the pancreas		3) High blood glucose levels		4) Low blood glucose levels	
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7			A child was brought with delayed developmental mile stones, hypoglycemia, congenital cataract and jaundice. On examination hepatosplenomegaly was noted. What is the probable diagnosis?							(1)								
<table border="1"> <tr> <td>1) Galactosemia</td> <td></td> <td>2) Von Gierke's Disease</td> <td></td> <td>3) Pompe's Disease</td> <td></td> <td>4) Cori's Disease</td> <td></td> </tr> </table>											1) Galactosemia		2) Von Gierke's Disease		3) Pompe's Disease		4) Cori's Disease	
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8			Following is a regulator of the enzyme Glycogen synthase							(1)								
<table border="1"> <tr> <td>1) Citric acid</td> <td></td> <td>2) 2,3 Bisphosphoglycerate</td> <td></td> <td>3) Cyclic AMP (cAMP)</td> <td></td> <td>4) GTP</td> <td></td> </tr> </table>											1) Citric acid		2) 2,3 Bisphosphoglycerate		3) Cyclic AMP (cAMP)		4) GTP	
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9			Blood is collected in fluoride oxalate bulb (tube) during the estimation of blood glucose to							(1)								
<table border="1"> <tr> <td>1) Prevent clotting</td> <td></td> <td>2) Preserve glucose</td> <td></td> <td>3) Preserve glucose and prevent clotting</td> <td></td> <td>4) Get quick results</td> <td></td> </tr> </table>											1) Prevent clotting		2) Preserve glucose		3) Preserve glucose and prevent clotting		4) Get quick results	
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10			Both glycolysis and gluconeogenesis pathways utilize all the following enzymes EXCEPT							(1)								
<table border="1"> <tr> <td>1) Phosphofructokinase</td> <td></td> <td>2) Glyceraldehyde 3 phosphate</td> <td></td> <td>3) 1,3 bisphosphoglycerate</td> <td></td> <td>4) Phosphoglucomutase</td> <td></td> </tr> </table>											1) Phosphofructokinase		2) Glyceraldehyde 3 phosphate		3) 1,3 bisphosphoglycerate		4) Phosphoglucomutase	
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			dehydrogenase		kinase			
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11 A 32-year-old male chronic smoker with strong family history of coronary artery diseases, attends routine health check-up and wants to know his risk for coronary artery diseases. Which of the following parameter is an independent risk factor for coronary artery diseases? (1)

1)	Low Density Lipoprotein Cholesterol.	2)	Total Cholesterol.	3)	Lipoprotein (A)	4)	Serum Triglyceride
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12 Following is an enzyme required for the synthesis of ketone bodies as well as cholesterol (1)

1)	Acetyl CoA carboxylase	2)	HMG CoA synthase	3)	HMG CoA reductase	4)	HMG CoA Lyase
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13 The following lipoprotein transports endogenous triglycerides in plasma. (1)

1)	VLDL	2)	Chylomicrons	3)	LDL	4)	HDL
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14 The lipoprotein HDL has the highest content of the following compound (1)

1)	Saturated fatty acid	2)	Glycerol	3)	Cholesterol	4)	Apolipoprotein
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15 The pH at which the molecule acts as **zwitterion** is called as (1)

1)	Isoelectric pH	2)	Isoelectric focussing	3)	Optimum pH	4)	Neutral pH
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16 Which of the following is formed by transamination of Aspartic acid? (1)

1)	Asparagine	2)	Malate	3)	Oxalosuccinate	4)	Oxaloacetate
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17 Which of the following amino acid when metabolised forms a vitamin? (1)

1)	Tyrosine	2)	Tryptophan	3)	Glutamic acid	4)	Histidine
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18 Which of the following amino acid is exclusively ketogenic? (1)

1)	Leucine	2)	Phenylalanine	3)	Threonine	4)	Isoleucine
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19 A 8 months old infant is brought with complaints of growth retardation, muscle wasting. The mother says she stopped breast feeding at 6 months of age and giving formula milk. Laboratory investigations: Total protein 6g/dL (normal -6-8gm/dl) Albumin 3.5g/dL normal-(2.5-5 gm/dl). What is the diagnosis. (1)

1)	Marasmus	2)	Kwashiorkor	3)	Marasmic Kwashiorkor	4)	Under weight
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20 Basal Metabolic Rate (BMR) is decreased in the following condition (1)

1)	Fever	2)	Pregnancy	3)	Starvation	4)	Hyperthyroidism
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Long Essay 10 X 2 = 20

Answer all the questions.

21 A 60 year old man was brought to the emergency with severe chest pain radiating towards left shoulder, breathlessness, vomiting and profuse sweating. He was suspected to have myocardial infarction on ECG findings. (10)

1. What are the different enzyme biomarkers used for diagnosis of Myocardial infarction (3 Marks)
2. Explain the different pattern of increase in the enzymes after the onset of Myocardial Infarction. (4 Marks)
3. Which are the non enzyme markers used to diagnose myocardial infarction ? (3 Marks)

22 Discuss the metabolism of sulphur containing amino acids. Write the disorders associated with their metabolism. (8+2) (10)

Short Essay Questions 9 X 5 = 45

Answer all the questions.

23 Explain the covalent modification of enzyme regulation with the help of graph. Give **TWO** examples. (5)

(3+2)

24			Explain Anaplerotic reactions of Krebs cycle.	(5)
25			Define Glycosaminoglycans. List FOUR glycosaminoglycans with functions.	(5)
26			Discuss synthesis of bile acids. Mention TWO functions of bile acids. (3+2)	(5)
27			Outline the steps for synthesis of cholesterol. Discuss the rate limiting step and regulation of synthesis of Cholesterol. (2+3)	(5)
28			A fair chubby boy of 5 years age was brought to the hospital with the complaint suggestive of mental retardation. Blood chemistry revealed that serum phenylalanine was abnormally high. Ferric chloride test on urine sample was positive. Phenylpyruvate, phenyl acetate and phenyl lactate were present in appreciable amounts in urine. a) What is the likely diagnosis of this case and enzyme defect? (2) b) Explain the cause for mental retardation, Was it preventable? (3)	(5)
29			Discuss the decarboxylation reactions of amino acids. Give TWO clinically significant compounds formed from decarboxylation and mention their importance. (3+2)	(5)
30			Define limiting amino acid of a protein. Mention the limiting amino acids of wheat, Bengal gram and rice. (2+ 3)	(5)
31			Boiling of egg, causes several biochemical changes in the egg protein, leading to hardening of egg. a) Explain the biochemical changes occurring in egg protein. (2 Marks) b) Compare and contrast denaturation with coagulation. (3 Marks)	(5)

Short Answer Questions 3 X 5 = 15

Answer all the questions.

32			Classify the transport mechanism across cell membrane.	(3)
33			During vigorous exercise lactic acid is formed. justify the statement.	(3)
34			High concentration of prostaglandins are used in treatment of postpartum haemorrhage. Justify.	(3)
35			Enumerate the factors to be considered while prescribing a diet.	(3)
36			The risk benefit analysis of a surgical procedure is explained by the Doctor to the Patient. Mention the role of the Indian Medical Graduate which is highlighted in this scenario. Enlist the other roles of an Indian Medical Graduate. (1+2)	(3)

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KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH

Biochemistry Paper 2 [BIO2]

Marks: 100

Duration: 180 mins.

MCQ 20 X 1 = 20

Answer all the questions.

Section Duration: 30 mins

- 1 Bile acids are conjugated with (1)
- 1) Methionine 2) Cysteine 3) Glycine 4) Glutamic acid
-
- 2 The important natural antioxidant is (1)
- 1) Vitamin B₁₂ 2) Vitamin E 3) Vitamin D 4) Vitamin K
-
- 3 All the following amino acids contribute to purine synthesis, **EXCEPT** (1)
- 1) Glycine 2) Aspartate 3) Glutamine 4) Cysteine
-
- 4 One of the following is antagonist to Vitamin K (1)
- 1) Avidin 2) British Anti - Lewisite 3) Dicoumarol 4) Menadione
-
- 5 Deficiency of Folic acid causes (1)
- 1) Microcytic anemia 2) Hemolytic anemia 3) Megaloblastic anemia 4) Beriberi
-
- 6 The uncouplers do **NOT** allow (1)
- 1) Oxidation of NADH 2) Oxidation of FADH₂ 3) Reduction of oxygen to Water 4) Synthesis of ATP
-
- 7 Plasma bicarbonate is increased in (1)
- 1) Metabolic alkalosis 2) Respiratory alkalosis 3) Respiratory acidosis 4) Metabolic acidosis
-
- 8 Which of the following causes hypokalemia? (1)
- 1) Hemolysis 2) Polycythemia 3) Leukemia 4) Persistent vomiting
-
- 9 A Healthy man weighing 70 kgs , has maximum water content in (1)
- 1) Extracellular fluid 2) Intracellular fluid 3) Plasma 4) Interstitial fluid
-
- 10 Which of the following molecules is an end product of heme degradation? (1)
- 1) Uroporphyrinogen 2) Coproporphyrinogen 3) Protoporphyrinogen 4) Urobilinogen
-
- 11 The elevated concentration of the following enzyme is associated with chronic alcoholism (1)
- 1) Alanine transaminase 2) Aspartate transaminase 3) Alkaline phosphatase 4) Gamma-glutamyl transferase
-
- 12 In patients with renal failure all of the following are typically elevated in serum, EXCEPT (1)
- 1) Urea nitrogen 2) Creatinine 3) Uric acid 4) Albumin
-
- 13 A 4 year old male child is brought to the hospital with complains of habit of biting of lips and fingers. On examination multiple bite marks were found on fingers and lips. Serum uric acid was found to be raised (1)

(9 mg/dl). What is the probable diagnosis?

1) Severe Combined Immunodeficiency Disease	2) Lesch Nyhan Syndrome	3) Von Gierke's Disease	4) Tay Sach's Disease
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14

A 20 year old lady complains of loss of appetite, early fatigue and lethargy. She gives history of excessive bleeding lasting for 10-15 days every month during menstruation . Her Hemoglobin level was found to be 8 gm%. Correlating the clinical history and the investigations, the gynaecologist gave the diagnosis of Iron Deficiency Anemia. Tick the correct presentation of Serum Iron and Serum Ferritin levels in Iron Deficiency Anemia

(1)

1) Both Serum Iron and Serum Ferritin Increase	2) Both Serum Iron and Serum Ferritin decrease	3) Serum iron increases and Serum Ferritin Decreases	4) Serum Iron decreases and Serum Ferritin Increases
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15

A 28 year old male comes to OPD with complains of frequent nocturnal muscle cramps in his left lower limb for past few months. On physical examination carpopedal spasm was noticed **while** taking Blood Pressure. Blood investigations revealed serum Calcium 6 mg/dl, Urea- 30 mg/dl, S creatinine- 0.8 mg/dl. The physician diagnosed it to be a case of Hypocalcemia. Mention the normal level of serum Calcium.

(1)

1) 6-8 mg/dl	2) 5 - 6 mg/dl	3) 9 - 11 mg/dl	4) 12 - 13 mg/dl
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16

A 20 year old woman was brought to the emergency room with acute abdominal pain and hysterical behaviour. Mother gave history of similar attacks in the past. An ultrasonogram showed no abnormalities in abdominal organs. Instructions were given to send the early morning fresh sample for delta aminolevulinic acid and porphobilinogen. What is the most likely diagnosis?

(1)

1) Hereditary protoporphyria	2) Porphyria Variiegata	3) Acute intermittent Porphyria	4) Hereditary Coproporphyria
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17

A 6 year old child presents to the hospital with yellow discolouration of eyes and loss of appetite and general malaise for past 1 week. Peripheral smear revealed sickle shaped RBCs. Mention the type of Jaundice in this child.

(1)

1) Hepatic Jaundice	2) Physiological Jaundice	3) Pre Hepatic Jaundice	4) Obstructive Jaundice
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18

Which of the following substances exert beneficial effects in the prevention of cancer?

(1)

1) Vitamin E	2) Beta-carotene	3) Vitamin C	4) All of the above
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19

Vaccination is an example of

(1)

1) Naturally acquired active immunity	2) Naturally acquired passive immunity	3) Artificially acquired active immunity	4) Artificially acquired passive immunity
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20

Edema in nephrotic syndrome is due to

(1)

1) Sodium and water retention	2) Increased venous pressure	3) Hypoalbuminemia	4) Hyperlipidemia
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Long Essay 10 X 2 = 20

Answer all the questions.

21

A **four** year old boy is brought with complains of delayed growth, delayed closure of anterior fontanelle, bowing of legs and pigeon chest. The serum Calcium level was found to be 8.0 mg/dl.

1. Mention the probable diagnosis along with the deficient Vitamin.
2. Describe the sources, RDA and functions of the deficient Vitamin. (2+2+2+4)

(10)

22

Define Genetic code. Discuss the salient features of genetic code. Add a note on Wobble hypothesis. (1+6+3)

(10)

Short Essay Questions 9 X 5 = 45

Answer all the questions.

23			A 45-year-old chronic alcoholic male presents to the emergency department with complaints of severe fatigue, muscle weakness and difficulty in walking. On physical examination, the patient has an unsteady gait and diminished reflexes in the lower extremities and nystagmus. Laboratory tests show elevated blood lactate levels and decreased transketolase activity in red blood cells . The patient is diagnosed with Wernicke-Korsakoff Syndrome. (5) i) Mention the deficient Vitamin responsible for this condition and its coenzyme form. (2 Marks) ii) Discuss the other deficiency disorders associated with this Vitamin. (3 Marks)
24			Enlist THREE Zinc containing enzymes. Write a note on Acrodermatitis Enteropathica. (3+2) (5)
25			Name the components of Plasma Bicarbonate buffer system. Discuss the plasma bicarbonate buffer system in acid base regulation. (1+4) (5)
26			A 72 year old woman in a semiconscious state who is admitted to the emergency ward for disorientation and restlessness. She had a medical history of Hypertension and was on treatment. On physical examination she was found to have reduced skin turgor, vomiting and hypotension. Lab investigation revealed Serum Sodium- 114 mEq/l, Potassium 4.1 mEq/l, Chloride- 102 mEq/l. The physician diagnosed it to be case of Hyponatremia. (5) a. Mention the normal range of serum Sodium. (1 Mark) b. Enlist two causes each for hyponatremia and hypernatremia. (4 Marks)
27			List the different hemoglobin derivatives . Add a note on methemoglobinemia.(3+2) (5)
28			List three Biologically Important Nucleotides. Describe the functions of any one . (3+2) (5)
29			Define Oxidative phosphorylation. Enumerate any three inhibitors of Oxidative phosphorylation (2+3) (5)
30			Enumerate three major types of RNA and mention their functions. (5)
31			A 6 years old girl was brought to the Outpatient Department with persistant developmental delay as well as multiple pigmented papular lesions on her face, neck, forearm, which aggravated on exposure to sun. A probable diagnosis of Xeroderma Pigmentosa was done. (5) 1) What type of defective DNA repair mechanism is this (1 mark). 2) Mention other two DNA repair mechanisms giving suitable examples. (4 marks)

Short Answer Questions 3 X 5 = 15

Answer all the questions.

32			Define Anion gap. List two causes for normal anion gap acidosis. (1+2) (3)
33			Mention the molecular defect in Beta Thalassemia major . List any two clinical features. (3)
34			Enumerate three tests for renal tubular functions. (3)
35			Mention the gene defect and clinical features of Osteogenesis Imperfecta. (3)
36			Discuss the commitment to lifelong learning as an important part of physician growth. (3)

-----End-----