



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 Cystic fibrosis results from defective ion channels for (1)
- 1) Sodium (Na) 2) Chloride (Cl) 3) Calcium (Ca) 4) Hydrogen (H)
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- 2 A 38-year male is brought to emergency department in unconscious state, with intake of illicit liquor consumption as told by his brother. First year resident suggest treatment with ethanol. Which of the following statements provides the best rationale for this treatment? (1)
- 1) Ethanol acts as a Non-Competitive inhibitor 2) Ethanol acts as Competitive inhibitor 3) Ethanol acts as suicide inhibitor 4) Ethanol acts as allosteric repressor
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- 3 Following is an example of Lyases (1)
- 1) Lactate dehydrogenase 2) Glutamine synthetase 3) Trypsin 4) Aldolase
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- 4 Serum creatine kinase levels are increased in the following condition (1)
- 1) Myocardial infarction 2) Infective hepatitis 3) Prostate cancer 4) Intravascular hemolysis
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- 5 Enzymes synthesized in inactive form are called (1)
- 1) Coenzymes 2) Proenzymes 3) Apoenzymes 4) Lysozymes
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- 6 Substrate level phosphorylation occurs in which of the following steps of the TCA cycle? (1)
- 1) Isocitrate to alpha ketoglutarate 2) Alpha ketoglutarate to succinyl CoA 3) Succinyl CoA to succinate 4) Succinate to fumarate
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- 7 Which of the following metabolite will increase in blood of a sherpa on the summit of Mount Everest? (1)
- 1) Glucose 1,6 bisphosphate 2) 2, 3 bisphosphoglycerate 3) 1,3 bisphosphoglycerate 4) Glyceraldehyde 3- phosphate
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- 8 Following polysaccharide is used as volume expander in treatment of hypovolemia (1)
- 1) Dextrin 2) Dextran 3) Heparin 4) Agarose
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- 9 Mc-Ardle syndrome is due to the absence of following enzyme (1)
- 1) Liver glycogen phosphorylase 2) Muscle glycogen phosphorylase 3) Liver phosphatase 4) Kinase
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- 10 35 years old came for routine health check. His lipid profile showed total cholesterol 248mg/dL and triglycerides 330mg/dL. On further enquiry he revealed to have had heavy breakfast before coming in for the health check. Which lipoprotein is responsible for the lipid profile results of this case? (1)
- 1) Chylomicrons 2) Very Low-Density Lipoproteins 3) Low Density Lipoproteins 4) High Density Lipoproteins
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- 11 A middle-aged obese woman comes with complaints of pain in the right hypochondriac region and passing bulky foul-smelling pale-coloured stools. She was diagnosed as obstructive cholelithiasis. What (1)

is the reason for pale bulky stools in this case?

1) Deficiency of enzymes needed for fat digestion	2) Deficiency of bile salts needed for fat digestion.	3) Deficiency of phospholipids needed for fat digestion.	4) Deficiency of brush borders of mucosal cells.
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12

Following is an enzyme required for the synthesis of ketone bodies as well as cholesterol

1) Acetyl CoA carboxylase	2) HMG CoA synthase	3) HMG CoA reductase	4) HMG CoA Lyase
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(1)

13

Following is the end product in Beta oxidization of odd chain fatty acids

1) Succinyl CoA	2) Propionyl CoA	3) Malonyl CoA	4) Valeryl CoA
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(1)

14

Apprehensive mother ran to the paediatrician as she noticed black colour staining of baby's diaper. What could be the probable diagnosis?

1) Phenylketonuria	2) Albinism	3) Alkaptonuria	4) Maple syrup urine disease
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(1)

15

Albinism occurs due to the deficiency of the following enzyme

1) Phenylalanine hydroxylase	2) Tyrosinase	3) Para hydroxyphenyl pyruvate oxidase	4) Tyrosine dehydrogenase
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(1)

16

Brain is very sensitive to Ammonia; hence, Ammonia is removed from brain mainly by formation of the following compound

1) Creatinine	2) Uric acid	3) Glutamine	4) Aspartamine
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(1)

17

Enzymes are activated by phosphorylation of following amino acid residue

1) Lysine	2) Serine	3) Cysteine	4) Tryptophan
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(1)

18

A young woman aged 22 years comes for routine health checkup. Height was 1.75 meters and was weighing 120 kgs. Calculate her Body Mass Index (BMI) and to which of the following category does she belong?

1) Normal	2) Overweight	3) Obese	4) Morbidly Obese
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(1)

19

Basal Metabolic rate (BMR) is raised in the following condition

1) Hyperthyroidism	2) Under nutrition	3) Starvation	4) Hypothyroidism
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(1)

20

Following is the limiting amino acid in Pulses

1) Leucine	2) Lysine	3) Methionine	4) Tryptophan
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(1)

Long Essay 10 X 2 = 20

Answer all the questions.

21

A 28 year old pregnant woman with 24 weeks of gestation had come for regular antenatal check up. The doctor advised her to undergo Oral Glucose Tolerance Test (OGTT). Following are the values of OGTT , FBS- 140 mg/dl, 30 minutes- 150 mg/dl, 60 minutes-220 mg/dl, 90 minutes- 200mg/dl, 120 minutes - 180 mg/dl

1. What is the probable diagnosis? (2 Marks)
2. Plot the graph for the given values and interpret the chart (3 Marks)
3. Discuss the procedure and mention the indications and contraindications to perform OGTT (5 marks)

(10)

22

Mention the normal range of plasma Cholesterol . Explain how cholesterol is transported from liver to peripheral tissue. Add a note on reverse cholesterol transport. (1+5+4)

(10)

Short Essay Questions 9 X 5 = 45

Answer all the questions.

23			A 30 year old man has recurrent arthritis attacks. On examination, signs of inflammation were present in several joints. Serum uric acid was grossly elevated along with its urinary excretion. Investigations also revealed deposition of urate crystals in the inflamed joints. Treatment was started with allopurinol at a daily dose of 50mg twice a day along with Ibuprofen and serratiopeptidase to control pain and inflammation. 1. What is the probable diagnosis? (2 Marks) 2. What is the rationale behind treating this patient with allopurinol and serratiopeptidase? (3 Marks)	(5)
24			Discuss the analytical use of enzymes in laboratory investigations.	(5)
25			Discuss the important features of Hexose Monophosphate Shunt Pathway.	(5)
26			Justify the statement "Gluconeogenesis is not merely a reversal of Glycolysis".	(5)
27			Define Eicosanoids. Enumerate the types of Eicosanoids. List the functions of prostaglandins. (1+1+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, phenylacetate and phenyl lactate were present in appreciable amounts in urine. a) What is the likely diagnosis of this case and enzyme defect? (2 marks) b) Explain the cause for mental retardation. Was it preventable? (3 marks)	(5)
29			Draw the flow chart of urea cycle and mention its regulation. (3+2)	(5)
30			Explain the different types of secondary structure of protein with suitable diagrams.	(5)
31			Describe in detail the steps involved in prescribing diet.	(5)

Short Answer Questions 3 X 5 = 15

Answer all the questions.

32			Digoxin increases myocardial cell contractility - Justify.	(3)
33			Differentiate metalloenzymes and metal activated enzymes. Give one example for each.	(3)
34			Name the branched chain amino acids and mention the enzyme defect in Maple syrup urine disease.	(3)
35			Dietary fibres can improve glucose tolerance - Justify.	(3)
36			A male Doctor while examining a female patient makes sure that a female attendant is also there during examination. 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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1) Proline hydroxylase	2) Alpha 1-antitrypsin	3) Dietary vitamin C	4) Elastase activity
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13

Activation of proto-oncogenes to oncogenes involves

1) Promoter insertion mechanism	2) Chromosomal translocation	3) Point mutation	4) All of the above
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(1)

14

Newborns get their antibodies from mothers milk . This is an example of

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

15

Antibodies are secreted by

1) Stem cells	2) Tissue cells	3) Plasma cells	4) Membranous cells
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(1)

16

A pregnant woman's ultrasound report revealed neural tube defects in the fetus. Which vitamin deficiency is most likely responsible for this condition?

1) Vitamin B1	2) Vitamin B6	3) Vitamin B9	4) Vitamin B12
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(1)

17

A woman in her 30s with history of Liver Cirrhosis presented to the emergency department with 8 months of worsening bilateral hand tremors. On examination a brownish green ring was observed around the cornea. The etiology is defect in which of the plasma proteins?

1) Transferrin	2) Alpha 1 Antitrypsin	3) Ceruloplasmin	4) C-reactive protein
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(1)

18

An 8-month-old child is brought to the pediatrician's office due to excessive sensitivity to the sun. Skin areas exposed to the sun for only a brief period of time were reddened with scaling. Irregular dark spots also appeared. The pediatrician suspects Xeroderma Pigmentosa, what is the genetic defect?

1) Mismatch repair	2) Double-stranded break repair	3) Base excision repair	4) Nucleotide excision repair
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(1)

19

All of the following vitamins have antioxidant property **EXCEPT**

1) Vitamin A	2) Vitamin C	3) Vitamin E	4) Vitamin K
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(1)

20

Reduced glutathione is a co-factor for the enzyme

1) Glutathione peroxidase	2) Glutathione reductase	3) Glutathione transferase	4) All of the above
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(1)

Long Essay 10 X 2 = 20

Answer all the questions.

21

Describe the sources & RDA, absorption & transport of Iron in the body. Mention the deficiency disorder of Iron along with **four** clinical manifestations . (2+ 5+3)

(10)

22

The following are the biochemical values in a 52 year old alcoholic patient. Serum bilirubin 13.0 mg%, Conjugated bilirubin 6.0mg%, Unconjugated bilirubin 7.0 mg%. Serum alkaline phosphatase 280 IU/L, AST 270 U/L, ALT 250 U/L.

- Interpret the laboratory findings of the given case.
- What is the probable diagnosis?
- Describe the formation, conjugation and excretion of Bilirubin. (4+1+5)

(10)

Short Essay Questions 9 X 5 = 45

Answer all the questions.

23

A 30 year old agricultural labourer was on a staple diet of maize and jowar. He developed clinical signs of dermatitis on sun exposed skin, chronic diarrhoea and memory loss.

(5)

- What is the diagnosis?

- b) Name the deficient vitamin and its coenzyme forms.
c) List **two** causes for this vitamin deficiency. (1+2+2)

24			A 50-year-old man was admitted to hospital with complaint of persistent vomiting. On examination, he was found dehydrated and his respiration was shallow. He gave past history of dyspepsia and was regularly on antacids. The arterial blood gas analysis is as follows . Blood pH- 7.72 ; Plasma HCO ₃ - 45 mmol/l ; pCO ₂ 40 mm Hg. a. Mention the arterial blood gas disorder. (5) b. Interpret the arterial blood gas findings c. Mention other two causes for this condition. (1+2+2)
25			Mention the biochemical defect in Sickle cell anemia. Justify increased resistance to malaria in people with Sickle Cell Trait. (2+3) (5)
26			List five biologically important nucleotides along with their functions. (5)
27			A 40 year old male presented with severe pain, redness and swelling of the base of the first metatarsophalangeal joint in the night. On examination he had mild fever of 38.2 degree C. The right big toe was swollen, warm, red and exquisitely tender. Serum uric acid was 9.7 mg/dL (3.5-7.5mg/dL) 1.What is the likely condition ? (1 Mark) (5) 2. Mention the causes for the above condition. (2 Marks) 3.Explain the rationale behind administration of Allopurinol in the treatment. (2 Marks)
28			Define Oxidative phosphorylation. Discuss the chemiosmotic coupling theory. (1+4) (5)
29			Explain the prokaryotic regulation of gene expression with Lac Operon model. (5)
30			Define Detoxification. Describe the different phases of detoxification with suitable examples.(1+4) (5)
31			Discuss the role of Vitamin E and Vitamin C as Antioxidant vitamins (2.5+2.5) (5)

Short Answer Questions 3 X 5 = 15

Answer all the questions.

32			Enumerate any three causes of metabolic alkalosis. (3)
33			Define Hyponatremia. List two causes for it.(1+2) (3)
34			Define Mutation and Mutagens. Give one example for each. (3)
35			Define oncogenes and give two examples. (3)
36			What are the attributes of a life long learner? (3)

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