

MBBS FIRST PROFESSIONAL (PART-II)
MODEL PAPER FOR ANNUAL 2009
Biochemistry
(Short Essay Questions)

Max. Marks 32.5

Time Allowed 2 hours

1. a) Draw and label a diagram to illustrate the components, organization and site specific inhibitors of electron transport chain. 2
b) How is 5-phosphoribosyl-1-pyrophosphate (PRPP) synthesized? Name the amino acid which takes part in purine ring formation. 1.5,0.5
2. a) What are the biochemical events involved in the causation of cataract in uncontrolled diabetes mellitus? 2
b) How creatine phosphate is synthesized? Calculate energy yield in the form of mole of ATP from one mole of palmitate. 1+1
3. a) What are the enzyme deficiencies in essential fructosuria and hereditary fructose intolerance? Write down the reactions catalyzed by these enzymes. Which one of these two conditions leads to severe hypoglycemia after fructose ingestion and why? What is the cause of hyperuricemia in this condition? 3
b) What is the role of glucose 6-phosphate dehydrogenase in red blood cells? 1
4. a) A 19 year old girl was referred to a University Medical Centre because of easy fatigability and poor exercise tolerance in her extremities. Several muscle biopsy were performed. Microscopic examination indicated that muscle was filled with vacuoles containing lipid. Chemical measurements indicated that these muscles specimen contained greatly elevated amount of triglycerides but only one sixth as much carnitine as biopsy specimen obtained from other patient who did not have any primary muscle disease.
i) What is main intracellular function of carnitine? 1
ii) Would you expect that the fatty acid β -oxidation is impaired in this patient? 0.5
b) Write down complete reaction for synthesis and utilization of ketone bodies? 2.5
5. Explain the biochemical basis of phenyl ketonuria, alkaptonuria and maple syrup urine disease. Mention the nutritional strategy to be adopted for treatment of phenyl ketouria? 3+1
6. a) A 32 year old male presents to ENT clinic with complaints of a sore throat. He reports numerous upper respiratory tract infections over the last three months. Patient gives a history of intravenous drug use in the past, but no other significant medical history is given. On examination, patient is found to have a temperature of 37.8°C (100.0°F) and is in minimal distress from the sore throat. His pharynx is erythematous and has numerous white plaques coating the throat.

There is also prominent cervical lymph node enlargement. His chest is clear to auscultation and heart is with regular rate and rhythm. A CD₄ T-lymphocyte cell count is performed and is less than 200 cells per mm³ (normal > 500).

He was diagnosed as a case of secondary infection to HIV infection. 0.5

- i) HIV is abbreviation of which pathogen? 0.5
- ii) Which enzyme is required for this pathogen to affect the host genome? 1
- iii) What is the biochemical mechanism that the pathogen uses to affect the patient cells?

- b) For each of the following steps in prokaryotic protein synthesis (1 to 4) indicate the most appropriate antibiotic (A-J) to inhibit the process. 2

- i) Transfer of the peptide from the peptidyl-tRNA to the amino acyl-tRNA and formation of a peptide bond.
- ii) Binding of amino acyl-tRNA from the A-site of the ribosomal complex.
- iii) Translocation of the peptidyl-tRNA from the A-site to the P-site.
- iv) Interference with the initiation of protein synthesis.

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|---------------------|-----------------|
| a) Amino glycosides | f) Lincosamides |
| b) Chloramphenicol | g) Neomycin |
| c) Erythromycin | h) Puromycin |
| d) Gentamicin | i) Streptomycin |
| e) Kanamycin | j) Tetracycline |

7. a) A baby aged 2 months, was admitted with 2 week history of vomiting and septicemia. On admission he was severely dehydrated and had circulatory collapse. Following investigations were performed.

Normal range

- | | | |
|--------------------|------------|-------------|
| • Na | 132 mEq/L | (135-145) |
| • K | 2.6 mEq/L | (3.5-5) |
| • Cl | 72 mEq/L | (93-108) |
| • HCO ₃ | 41.4 mEq/L | (22-26) |
| • pH | 7.77 | (7.35-7.45) |
| • pCO ₂ | 36 mmHg | (35-45) |

- i) What is your diagnosis? 0.5
- ii) Is there any compensation? 0.5
- iii) How does change in blood pH influence distribution of potassium and chloride ions in intracellular and extracellular fluid? 1

- b) What is the significance of dietary fiber? Find out the caloric requirement / day of a 10 year old school boy who is moderately active and his BMR is 400 KCal (energy expenditure for moderate physical activity is 5 times that of BMR). 2

8. What are the steps for synthesis and secretion of thyroxin? 4.5