SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION AND RESEARCH
(A Deemed to be University)
MBBS Phase I Examination September 2025

Time: 150 Minutes **Max Marks: 80 Marks**

Biochemistry Paper I
QP CODE: C1031

Your answer should be specific to the question asked
Draw neat labelled diagrams wherever necessary

Long Essay ***2 X 10 = 20 Marks***

1. Define Homocystinuria. Describe the steps of biochemical basis of Homocystinuria. Mention the test to diagnose Homocystinuria. (1+7+2)
2. A 20-year-old medical student is studying for an upcoming exam after a carbohydrate-rich meal. Her body begins oxidizing glucose to meet the energy demands of the brain and other tissues. The complete oxidation of one glucose molecule involves a series of interconnected biochemical cycles operating in a coordinated manner to produce ATP.
   a. Name the metabolic cycles involved in the complete oxidation of glucose. (2 marks)
   b. Choose any one of these cycles and explain its reactions, highlighting key intermediates and enzymes. (6 marks)
   c. Add a note on the energetics of the chosen cycle, including the ATP yield. (2 marks)

Short Essay ***12 X 5 = 60 Marks***

3. Explain briefly the need, scope and importance of lifelong learning by a physician. (1.5+1.5+2)
4. Write the procedure for isolation and identification of subcellular organelles. (2.5+2.5)
5. Describe the characteristic features and significance of Lactosazone & Maltosazone
6. What are reactive oxygen species? Name them and describe their sources. (1+1+3)
7. Explain the maintenance blood glucose levels in the fed state.
8. Define dipeptide and tripeptide. Give suitable examples for each. (2.5+2.5)
9. A 20-year old female was brought to the Emergency Department with nausea, vomiting and abdominal pain. She had been under a lot of stress with final examinations. In her hostel room, her friends noticed an empty bottle of Acetaminophen near the bed. Laboratory tests revealed hypokalemia and elevated liver enzymes. Her WBC count was normal. Her acetaminophen blood level was above 200 femtogram/ml. She was given a gastric lavage and prescribed oral N-acetylcysteine.
   a) Name the conjugating agent used in detoxification of Acetaminophen. (1)
   b) Explain the pathophysiology of liver toxicity in this patient. (4)
10. A 46-year-old male presented to the emergency department with severe right toe pain. The patient was in usual state of health until early in the morning when he woke up with severe pain in his right big toe. The patient denied any trauma to the toe and no previous history of such pain in other joints. He did say that he had consumed liquor with his friends the previous night. His serum uric acid levels were markedly elevated and he was subsequently started on Allopurinol for Gout.
    a. Define suicide inhibition.
    b. Describe the mechanism of action of allopurinol as a suicide inhibitor
    c. Mention one more suicide inhibitor and its application. (1+2+2)

11. A 7-month-old child fell over while crawling and presented with a swollen leg. History revealed that at the age of one month the baby had multiple fractures in various states of healing in the right clavicle, right humerus. An X-ray taken from the affected leg revealed a fracture of a bowed femur. The bones were thin, with thin cortices. History of child abuse was ruled out by careful questioning from the parents A diagnosis of osteogenesis imperfect made was, which is a condition due to defect in gene encoding Type 1 Collagen.
    a) What is collagen? (1)
    b) Describe the Structure of collagen? (2)
    c) Write the biological functions of collagen. (2)

12. A 45-year-old man presented with severe back pain and weakness. He had lost 7 Kg in the last 3 months. Loss of appetite is present. No history of fever. He reports extreme fatigue, body pain and complains that he is unable to do any work. X-ray of skull revealed punched out lesions. Bone marrow biopsy was done and it showed plasma cells in excess. Serum electrophoresis was ordered on the basis of clinical features. It showed an abnormal band between beta globulin and gamma globulin. Urine was positive for Bence Jones Proteins.
    a) What is the probable diagnosis?
    b) What are Bence Jones Proteins. explain the test procedure
    c) Write the findings observed in electrophoresis band. (1+2+2)

13. A 2-year-old boy was brought to the hospital. He was eating poorly for the last month, had intermittent diarrhoea and had become irritable and apathetic. On examination, he was underweighted for height, pale, weak, skin was flaky, hair was brittle, abdomen was distended, liver was moderately enlarged, generalized oedema was present. Laboratory diagnosis revealed a Hb- 6.5 g/dL, Total protein-4.0 g/dL and albumin- 1.8 g/dL
    a) What is your probable diagnosis?
    b) What are the causes for this condition?
    c) Describe the pathophysiology of this condition
    d) What is the reason for generalized oedema seen in this case (1+1+2+1)

14. A 25 yrs. old agriculture labourer living in a remote village in central India was on a maize and Jowar staple diet for several years. He developed clinical signs of dermatitis on those parts of the body exposed to sunlight, chronic diarrhoea and associated psychiatric symptoms such as delirium and loss of memory.
    a) What is your probable diagnosis?
    b) Which vitamin deficiency causes this disease?
    c) What is the coenzyme form of this Vitamin?
    d) Why consumption of Maize and Jowar diet is linked with the deficiency of this vitamin?

(1+1+1+2)

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Biochemistry Paper II
QP CODE: C1032

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Long Essay ***2 X 10 = 20 Marks***

1. Define pH. What is normal blood pH? List the various mechanisms in our body to regulate blood pH. Explain the mechanisms by which blood pH is maintained in the body. (1+1+3+5)
2. An eighteen-year-old girl consulted her family physician because of tiredness and weight loss. On interrogation, she admitted of feeling thirsty and passing more urine than normal. Next day her physician examined and found that she had deep, sighing respiration (Kussmaul's respiration) and her breath had fruity odour. Blood sample was collected and sent to laboratory for investigations which concurred with the diagnosis of diabetes mellitus. She was started on injection recombinant human insulin.
   a. Define recombinant DNA technology
   b. What are molecular scissors?
   c. Describe the steps in recombinant DNA technology.
   d. List any six proteins produced by recombinant DNA technology other than human insulin. (1+2+4+3)

Short Essay ***12 X 5 = 60 Marks***

3. What are high energy compounds? Give four examples and mention their biomedical importance. (1+2+2)
4. What are nucleosides? Describe the glycosidic bond in purine and pyrimidine nucleosides. (1+4)
5. Describe the regulation of HMG CoA reductase. Mention its clinical significance. (3+2)
6. Name Ketone bodies. Explain the synthesis & utilization of ketone bodies (1+2+2)
7. Describe the Denovo synthesis of adenosine.
8. Describe the role of physician at various levels of Health care system.
9. List the thyroid hormones. Describe the biochemical investigations for evaluating Hyperthyroidism. (1+4)
10. A new born baby presented with yellowish discoloration of skin & conjunctiva after 3 days of birth. By history and confirmation Rh incompatibility was ruled out. The neonatologist advised phototherapy. Phototherapy was given, the child became normal.
    a) Write the probable diagnosis?
    b) Explain the biochemical abnormality associated with this condition?
    c) How does phototherapy benefit the child? (1+3+1)

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11. A 24-year-old woman who had put on weight after child birth was advised by her physician to reduce her weight by following a diet chart. Being impatient however, she stopped consumption of oils and fats. After a few months she lost weight but developed skin lesions on posterior and lateral area of her limbs. She was diagnosed as having phrynoderma.
    a) Name the essential fatty acids
    b) Why are these fatty acids considered as essential?
    c) Give 5 functions of essential fatty acids. (1.5+1+2.5)

12. A 54-year-old overweight woman presented with complaints of cramps and spasms of both hands. she was depressed and on examination had positive Trosseau's and chovstek's signs. A diagnosis of Hypocalcemia was made.
    a) What is the Normal Biological reference range of Serum Calcium?
    b) Write the Biochemical functions of Calcium. (1+4)

13. A 46-year-old man known hypertensive was admitted to a hospital as he had suffered for 2 days with a very painful, slightly swollen first toe (Metatarsophalangeal joint). There was no present history of trauma or past history of joint related problems, X-Ray was normal. He denied history of smoking or illicit drug use but admitted to occasional alcohol consumption in moderate amount. His serum uric acid was 8.8mg/dl.
    a) What is your probable diagnosis? (1)
    b) What is Uric acid. (1)
    c) What is the normal reference range of blood uric acid? (1)
    d) Give a treatment plan for management of this clinical condition. (2)

14. A 55-year old man was brought to the Emergency Department with multiple injuries in a road traffic accident and crush injuries, fractures of the legs and scalp lacerations. He was conscious and breathing spontaneously. His Pulse was 130/min, BP 60/40mm Hg, Serum sodium 142mEq/L, potassium 7.9mEq/L, chloride 110mEq/L, blood urea 40mg/dL and serum creatinine 1.2mg/dL.
    a) What is the probable diagnosis? (1)
    b) Write the biological reference range for: i. serum sodium (1) ii. serum Potassium (1)
    c) What is the basis of elevated serum potassium levels? (2)