All India Institute of Medical Sciences, Kalyani

First Professional MBBS Examination 2022 (Batch-2021-22)

Time: 3 Hrs. **Physiology (Paper–I)** **Marks: 100**

INSTRUCTIONS:

- Answer all questions.
- Illustrate your answers with well labelled diagram wherever necessary.
- Answer each section in a separate answer book.

SECTION – A (50 MARKS)

1. A family brings their 14-year-old child into a clinic. They explain to the attending physician that the child has been tiring more quickly than his peers in physical activities at school. They note that the child has always been clumsy, developed walking noticeably later than his siblings and demonstrated difficulty jumping and climbing when compared to his peers. A subsequent physical exam showed proximal muscle weakness and routine blood work showed an increase in creatine kinase. The physician ordered a genetic test and found a mutation in the dystrophin protein. (1+2+2+5=10)
   a) What are the contractile proteins in a skeletal muscle?
   b) Enumerate the functions of dystrophin protein in skeletal muscle.
   c) Explain the pathophysiology of the above disease.
   d) Describe the molecular mechanism of skeletal muscle contraction.
2. Compare and contrast the features of white and red skeletal muscle fibers. (5)
3. Describe the exocrine secretion of pancreas. (5)
4. A. How do changes in ECF Potassium and Calcium affect the excitability of nerve and skeletal muscle? (2½)
   B. Describe the secondary active transport with one example. (2½)
5. Describe the causes and treatment of obesity. (5)
6. Explain the physiological basis of (5X1=5)
   a) Pernicious anemia
   b) Neutrophilia in exercise
   c) Prolonged clotting time in vitamin K deficiency
   d) In infants, defecation often occurs after a meal.
   e) Action potential is a one type of positive feedback mechanism.
7. Explain the regulation of erythropoiesis. (5)
8. Describe the different phases of gastric juice secretion.Add a note on peptic ulcer. (3+2=5)
9. Explain the pathophysiology of events that occur due to mismatched blood transfusion. How can we prevent the mismatched blood transfusion? (3+2=5)

SECTION – B (50 MARKS)

1. A 50-year-old man is brought to the emergency room complaining of severe chest pain, shortness of breath, nausea, and anxiety. ECG shows displacement of J point from isoelectric line. He is obese and his skin is clammy. In a clear voice, he tells the physician that his symptoms began shortly after he tried to run after a man who had stolen a woman's purse and admits that he has not been taking the statin drug that his primary care physician prescribed because he believed it was causing muscle weakness. Blood tests reveal elevated levels of troponins and creatine kinase. (1+4+3+2 =10)

    a) What is the most likely diagnosis?
    b) Describe the factors affecting cardiac output.
    c) Describe the control of coronary blood flow.
    d) What is the coronary steal phenomenon?

2. Describe the nervous regulation of respiration. (5)
3. Describe the pathophysiology of acute mountain sickness. How it can be prevented? (3+2=5)
4. Compare and contrast nonprogressive and progressive shock. (5)
5. Describe the Oxygen-Hemoglobin Dissociation curve with suitable diagram. (5)
6. Describe the effect of centrifugal acceleratory force on body of aviator. (5)
7. What is hypoxia? Describe the different types of hypoxia. (1+4=5)
8. Explain with flow chart the role of renin-angiotensin system in control of arterial pressure. (5)
9. Explain the physiological basis of (5X1=5)
    a) Shivering occurs in exposure to extreme cold environment.
    b) Bainbridge reflex
    c) Hearing-Breuer inflation reflex
    d) Dysbarism
    e) Splitting of second heart sound during exercise.
