



All India Institute of Medical Sciences, Kalyani
1st Professional MBBS Examination 2020

Time: 3 Hrs.

Physiology (Paper-I)

Marks: 100

INSTRUCTIONS:

- Answer all questions and draw well labelled diagrams wherever necessary.
- Answer Sections A and B in separate answer booklets.
- Write answers in sequence and strike off all blank pages

SECTION A (50 Marks)

1. A 30- year-old mother brought her child to the hospital and her physician found that child is having dyspnoea, cyanosis, edema and marked jaundice. On further examination, the child showed pallor, hepato-splenomegaly, and muscular rigidity. Mother's blood group was found to be AB-ve. Her previous child birth was an uneventful full-term vaginal delivery and the child was A+ve. Mother did not receive any subsequent immunizations after her first child birth. (3+3+2+2=10)
 - a) State your diagnosis of this child and explain the physiological basis of this condition.
 - b) Explain why her first child delivery was uneventful.
 - c) Had you known the condition of the patient earlier, explain how you would have prevented this condition.
 - d) Explain the physiological principles involved in the treatment of this condition.
2. With the help of a suitable diagram, explain the mechanism of fibrinolysis. Name one fibrinolytic drug and mention its use. (1+2+1+1=5)
3. With the help of a suitable diagram, depict the secondary active transport of glucose in the intestine. Write briefly about gap junctions. (3+2=5)
4. Explain the role of sarcotubular system in the mechanism of skeletal muscle contraction and relaxation. (3+2=5)
5. Explain the mechanism of absorption of vitamin B12 from gastrointestinal tract. Add a note on pernicious anaemia. (3+2=5)
6. List the differences between graded potential and action potential. Explain the mechanism of saltatory conduction in neuron. (2+3=5)
7. What are the constituents and functions of the pancreatic juice? How is the pancreatic secretion controlled? (1+2+2=5)
8. Explain the mechanisms that help in protecting the stomach against auto digestion by gastric acid and pepsin. (5)
9. Define hemostasis. Enumerate the Vitamin K dependent factors and their functional characteristics. (2+3=5)



SECTION B (50 Marks)

1. Define stroke volume and ejection fraction and give their normal values. List the factors affecting stroke volume and explain their roles. Explain the physiological basis of splitting of the second heart sound. (2+6+2=10)
2. Draw and describe the pressure and volume profile of left atrium and left ventricle during cardiac cycle at rest. (2+3=5)
3. Draw and explain the ventilatory responses to decreased O₂ concentrations in the inspired air. (5)
4. Draw a labelled diagram of oxygen-haemoglobin dissociation curve. What is P50? List the factors shifting the O₂-Hb dissociation curve to left and right. (2+1+1+1=5)
5. With the help of flow chart, explain why and how there is increase in blood pressure immediately (<3sec) on standing. (5)
6. Define and Classify hypoxia. Explain briefly the basis and their characteristic features. Enumerate the possible causes of "happy hypoxia" (silent hypoxemia) in COVID-19 patients. (2+2+1=5)
7. Briefly enumerate the major systemic circulatory changes during a moderate isotonic exercise. What is isocapnic buffering? (4+1=5)
8. Explain the electrophysiological basis of the following patterns of QRS complexes in normal electrocardiogram recordings, (3+2=5)
 - a) QRS complexes are mainly negative in V₁ and V₂ whereas they are mainly positive in V₄, V₅ and V₆ chest leads.
 - b) QRS complexes are mainly negative in lead aVR whereas they are mainly positive in leads aVL and aVF.
9. Draw a labelled diagram of pacemaker potential and give its ionic basis. Mention the effects of sympathetic and parasympathetic stimulation on pacemaker potential. (1+2+1+1=5)