2021 ABC(O)PY-I/20

PHYSIOLOGY

PAPER-I

Time Allowed — 3 Hours *Full Marks — 200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

*Answers may be given either in **English** or in **Bengali** but all answers must be in one and same language.*

Group-A

Answer *any three* questions.

1. (a) What is pH? Mention the physiological importance of buffers in human blood.
   (b) State the biological applications of osmosis.
   (c) State the importance of "alkali reserve" in plasma.
   (d) State in brief about osmotic work.

2. (a) Explain why a disaccharide like 'lactose' exhibits reducing property, where as sucrose does not. 10+10+10+10=40
   (b) Write short notes on stereoisomerism and anomerism.
   (c) Write the systemic name and structure of histidine and valine.
   (d) Write the reaction of monosaccharides with concentrated mineral acids and excess phenylhydrazine.
   (e) What information you could get from the titration curve of glycine?

3. (a) State about the different reaction mechanisms of deamination of amino acids. 6+(5+5)+(3+3)+(5+5)+8=40
   (b) What is R–L cycle? State its significance.
   (c) Write the sources of NADPH and acetyl-coA for lipogenesis.
   (d) How can different hexose sugars enter the pathway of glycolysis?

4. (a) Discuss the biological functions and deficiency symptoms of calcium in our body. 10+10+(5+5)+10=40
   (b) What do you mean by hypervitaminosis D? State the functions of vitamin K in blood coagulation and carboxylations.
   (c) State briefly the principles of formulation of balanced diet for lactating woman.
   (d) What are fundamental foods?
   (e) Discuss the functions of vitamin A in glycoprotein synthesis and growth promotion. 10+(3+7)+10+(3+7)=40

5. (a) Why haem is tagged with globin? Describe the fate of haemoglobin in our body.
   (b) Why secondary immune response onsets faster than primary immune response?
   (c) State any four requirements of a molecule for being an immunogen.
   (d) Describe the physiological basis of ABO blood group system.
   (e) Describe plasmapheresis with its significance. (3+7)+10+10+10=40

Group-B

Answer *any two* questions.

6. (a) Graphically show the pressure changes in the atria during different phases of cardiac cycle and explain.
   (b) Briefly describe the origin and significance of ECG waves.
   (c) Discuss in brief about different types of electrocardiographic leads used to record ECG.
   (d) State Starling's Law of heart.
   (e) Name two types of cell junctions found at the intercalated disc. Mention their functions. 10+10+10+4+(2+4)=40

7. (a) What is cardiac output? Discuss the factors affecting it.
   (b) Discuss in brief about "Stannius ligature" and "Overdrive suppression".
   (c) Elucidate the process of origin and spread of cardiac impulse.
   (d) Describe the Fick's principle of cardiac output measurement. (2+8)+(5+5)+10+10=40

8. (a) Describe the effects of temperature, pH, pCO_2 and 2-3 BPG on the dynamics of oxyhaemoglobin dissociation curve.
   (b) What is hypoxia? Elaborate different types of hypoxia.
   (c) How is Functional Residual Capacity (FRC) of an individual determined?
   (d) What is spirometry? What is the significance of alveolar surfactant? Mention its source and composition. 10+(2+8)+10+(3+3+1+3)=40

9. (a) Describe the forces involved in the process of glomerular filtration.
   (b) Briefly describe the non-excretory functions of Kidney.
   (c) Describe the effect of the deficiency of ADH in the formation of urine.
   (d) Discuss the role of kidney in the regulation of acid-base balance of the body fluids. 10+10+10+10=40
