Q.1 Summarize the principal mechanisms by which chemical messengers exert their intracellular effects.

Q.2 a) What role does intact vascular endothelium play in anti-coagulation?
    b) Summarize the role of helper T-cells in the regulation of immunity.

Q.3 A college boy was severely injured in a road side accident. He was brought to the emergency department of a hospital while bleeding profusely. He was transfused two pints of blood. The boy developed post-transfusion reaction.

    a) Which type of bilirubin will be found elevated in his blood secondary to hemolysis? Will it be excreted in urine or not? Give its reason.
    b) Why cross-matching is important prior to blood transfusion?
    c) How is blood stored in the blood bank?

Q.4 A 58-year-old woman has atrial fibrillation with a rapid ventricular response and congestive heart failure. She has run out of digoxin.

    a) What is the cause of production of fourth heart sound (S₄) in a healthy person?
    b) Why does this patient not have an audible S₄?
    c) What factors affect stroke volume?
    d) How does stimulation of muscarinic receptors affect myocardial contractility?

Q.5 a) Outline two mechanisms which control blood flow to the skeletal muscle?
    b) What are differences between cerebral circulation and skeletal circulation?
Q. 6 Following conditions are responsible for producing hypoxia. Will they all be associated with hypercapnia or not? Justify your answer by giving reasons.

a) Pulmonary edema
b) Restrictive lung disease
c) Cyanide poisoning
d) High altitude

Q. 7 Why natives living at high altitude are considered superior to the low-landers regarding acclimatization?

a) How positive “G” influences the circulatory system?
b) How high altitude acclimatized individuals utilize oxygen more effectively than the low-landers?

Q. 8
a) Which part of the gastrointestinal (GI) tract is composed of striated muscle and smooth muscle?
b) What factors are responsible for the tonic contraction of the lower esophageal sphincter (LES) between swallows?
c) What are the major neurotransmitters responsible for regulating contraction and relaxation of the LES?
d) Enlist the products of carbohydrates, lipids and proteins absorbed in small intestine.

Q. 9 A 19-year-old college student presents to the emergency center with salicylate poisoning and an anion gap acidosis.

a) What is anion gap? Give its significance.
b) What effect does metabolic acidosis have on the respiratory system?
c) Name chemoreceptors that are involved in response to an acid–base disturbance.

Q. 10 a) How glucose is re-absorbed in the renal tubules?
b) Which other solutes get reabsorbed in the renal tubules by active transport?
c) What is the significance of renal threshold for glucose?
Q.11

a) What type of smooth muscle (unitary versus multiunit) is present in the bronchi of the lungs?
b) Why does smooth muscle not appear striated?
c) What is the molecular basis of contraction in a smooth muscle?
d) Outline the effect of changing ECF sodium ion concentration on nerve fiber action potential.

Q.12

a) Which part of the cerebellum is responsible for planning and initiation of a voluntary movement?
b) Is the output of cerebellar cortex excitatory, inhibitory or both? Name the neurotransmitter of Purkinje cells?
c) What type of memory is available for conscious retrieval? Name the part of brain that stores the semantic (factual) memories.

Q.13 What do you understand by?

a) Coding for pitch in the ear
b) HOMonymous quadrantanopia
c) Colour blobs
d) Visual axis of eye
e) Optical axis of eye

Q.14

a) What effect does epinephrine have on pancreatic islet cells?
b) What effect does prolonged fasting have on cortisol secretion?
c) How many calories does per gram glucose provide?
Q.15 A 20-year-old lady with normal hormone physiology complains of failure of her full term healthy baby to receive mother feed. She also complains that her newborn prefers to sleep for 20 hours in a day.

a) How will you facilitate her breast feeding, physically?
b) Explain to her in simple words the physiological reflexes involved in breast feeding
c) What are the endocrinal changes in the mother during pregnancy?

The End