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**Question Paper Code: R2B04**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Second Semester

Biomedical Engineering

R21UBM204- HUMAN ANATOMY AND PHYSIOLOGY

(Regulations R2021)

Duration: Three hours

Maximum: 100 Marks

Answer All Questions

PART A - (10 x 2 = 20 Marks)

1. Define the term membrane potential. CO1-U
2. If the concentration of potassium ions inside a cell is 10 times higher than outside, what would be the expected membrane potential according to the Nernst equation? CO1-U
3. Define cardiac cycle. CO1-U
4. Mention the primary role of the respiratory control centers in the brain. CO1-U
5. Compare the difference between a graded potential and action potential. CO1-U
6. Differentiate sympathetic and parasympathetic nervous system. CO1-U
7. What is the role of the urinary bladder in the urinary system? CO1-U
8. Describe the function of pancreas and liver. CO1-U
9. Mention the role of the retina in the visual system CO1-U
10. Classify the different types of bones. CO1-U

PART – B (5 x 16= 80 Marks)

11. (a) (i) Draw the neat diagram of the cell structure and write the functions of each organelles in detail. CO1-U (8)
- (ii) Compare and contrast the different process involved in transportation of substances across cells. CO1-U (8)
- Or
- (b) (i) How does the structure of the plasma membrane allow for the selective permeability of the cell? CO1-U (8)
- (ii) Differentiate the types of cell division Mitosis and Meiosis. CO1-U (8)

12. (a) i) Apply the Boyle's law in thoracic cavity, describe the mechanics of breathing and the organs forming the respiratory passage way from the nasal cavity to the alveoli of the lungs. CO2-App (12)  
 ii) Briefly explain the importance of the heart valves. CO1-U (4)  
 Or
- (b) i) Examine the elements of the conduction system of the heart and describe the pathway of impulses through this system. CO2-App (12)  
 ii) Draw the graph of various respiratory volumes in a healthy man. CO1-U (4)
13. (a) i) Describe the structure, properties and functions of neuron with a neat diagram. CO1-U (8)  
 ii) Explain about the transverse section of the spinal cord. CO1-U (8)  
 Or
- (b) i) Discuss the types of receptors in autonomic nervous system and explain its functions. CO1-U (8)  
 ii) Compare and contrast the structures and functions of the central and peripheral nervous systems. CO1-U (8)
14. (a) Explain the organs of digestive system with a neat sketch. Summarize the essential activities of gastrointestinal tract and describe the functions of local hormones in digestive system. CO1-U (16)  
 Or
- (b) Interpret the mechanics of urine formation, reabsorption, secretion and acid base regulation with a neat diagram. CO1-U (16)
15. (a) (i) Define cartilage and describe the functions of various types of cartilage. CO1-U (8)  
 (ii) Explain the sense organ ear with a neat sketch. CO2-App (8)  
 Or
- (b) (i) Describe the microscopic structure of myofibril in skeletal muscle with diagram and explain the role of actin and myosin. CO1-U (8)  
 (ii) Explain in detail about the various types of joints and their location in the human body. CO2-App (8)