



B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

BIOTECHNOLOGY

U18BTE0013: Human Physiology and allied Diseases

COURSE OUTCOMES

- CO1:** Describe the digestion and absorption physiology, and to evaluate the pathophysiological conditions.
- CO2:** Understand, elaborate and interpret the functioning of cardiac cycle, mechanism of regulation of blood pressure, and allied pathophysiology.
- CO3:** Demonstrate the physiological and pathophysiological processes of renal and respiratory systems.
- CO4:** Discuss the phenomenon of conduction of nerve impulses and interpret the mechanism of Parkinson's disease.
- CO5:** Understand and illustrate the physiological phases of spermatogenesis and menstrual cycle, and explain the etiology of menopause.
- CO5:** Analyze and interpret the clinical oriented diagnostic results of selected diseases.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

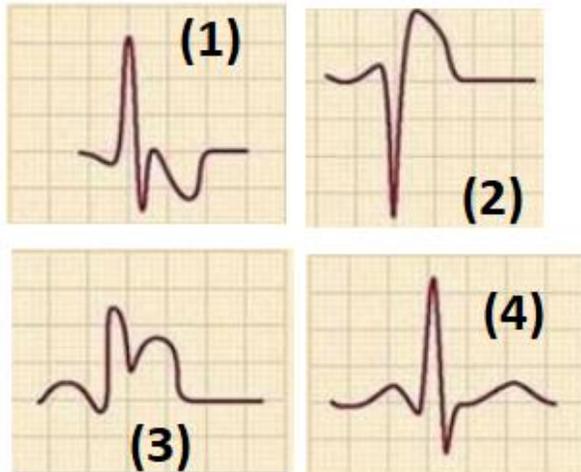
PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- Name the bifunctional carbohydrase secreted by the intestinal duodenal cells. CO1 [K₁]
- Observe the below shown three different cells. Which cell do you consider for a maximal and effective absorption process? Why? CO1 [K₄]



- What does the blood pressure values indicate? (Hint: Relate with the cardiac cycle). CO2 [K₃]
- Observe the ECG pattern of FOUR different individuals shown below. CO2 [K₄]



Identify the persons who have contracted STEMI and NSTEMI.

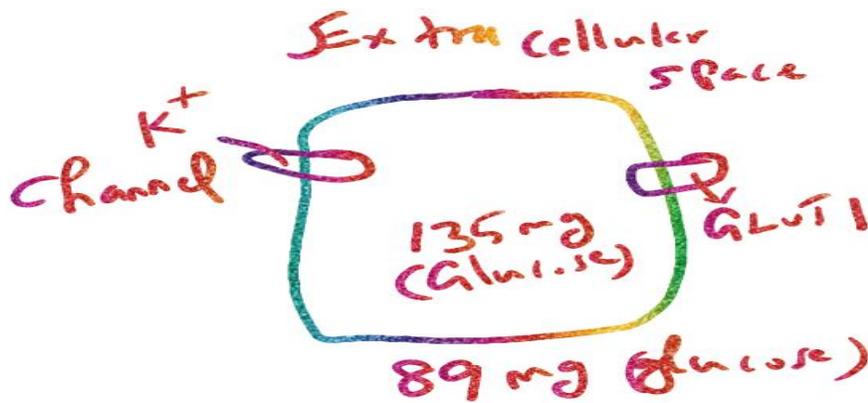
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|-----|--|-----|-------------------|
| 5. | How is blood reconstituted after the filtration process in glomerulus? | CO3 | [K ₃] |
| 6. | Provide any TWO non-respiratory functions performed by the respiratory system. | CO3 | [K ₂] |
| 7. | Assume that a greater amount of K ⁺ ions are diffused across the neural membrane (i.e., inside to outside the membrane). What could be the recorded mV inside the membrane? (Hint: Just comment whether it could be positive or negative mV). | CO4 | [K ₃] |
| 8. | What is spermatogenesis? | CO5 | [K ₂] |
| 9. | Write the normal levels of total bilirubin and PT. | CO6 | [K ₂] |
| 10. | What is familial hypercholesterolemia? Write the normal range of plasma cholesterol level. | CO6 | [K ₂] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

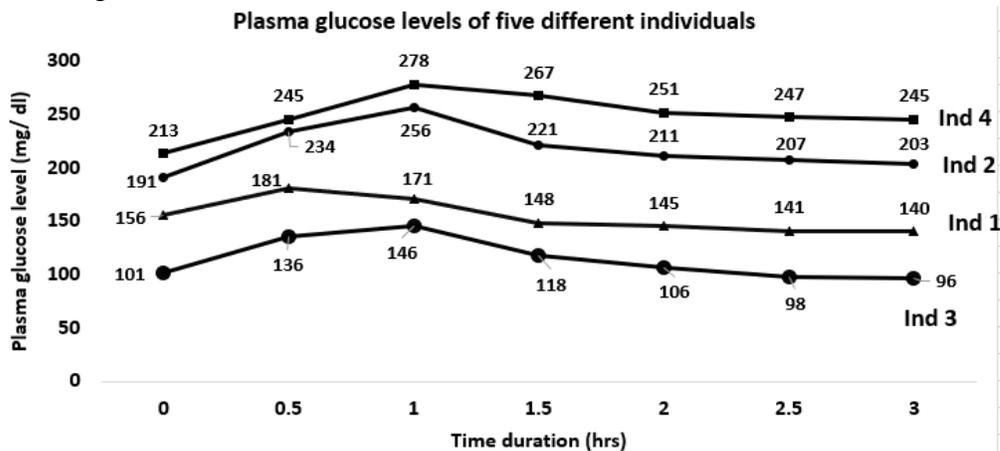
(Answer not more than 400 words)

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|-----|----|---|----|-----|-------------------|
| 11. | a) | Describe the composition of pancreatic juice and outline the role of secreted protein digesting enzymes. | 10 | CO1 | [K ₂] |
| | b) | Recall the mechanism of secretion of insulin and answer the following questions: | 6 | CO1 | [K ₅] |
| | | i) What happens if the cytosol of a pancreatic β- cell acquires high electropositive nature? | | | |
| | | ii) Observe the below depicted pancreatic β- cell with the projected level of glucose. Whether insulin secretion will be promoted? Why? | | | |



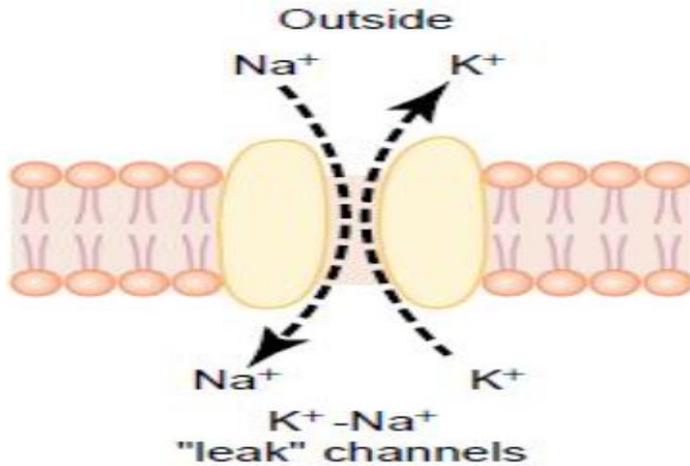
12. a) Explain the cardiac cycle in crisp with the appropriate steps. 10 CO2 [K₂]
 b) Assume that an individual had consumed salty and slightly peppered potato fries. He had a long history of hypertension. 6 CO2 [K₅]
 i) Whether there is any chance of an increase in blood pressure? (Just comment “yes” / “no”)
 ii) What is the status of ACE and angiotensin II?
 iii) Whether we have any hormone(s) to increase the water reabsorption in the kidneys in order to restore BP? If so, name the same.

13. a) Observe the depicted OGTT plot of FOUR different individuals and answer the following: 10 CO6 [K₅]



- i) Identify the individuals who are affected by chronic diabetes mellitus (DM).
 ii) Which individuals will record a positive result for glycosuria?
 iii) Assume that the average glucose concentration of an individual is 114 mg/ dl after undergoing the OGTT. Calculate the HbA1C and comment about his / her pathophysiologic condition.
- b) Write a short note on the clinical interpretations in the identification of different types of jaundice using VD Bergh reaction. 6 CO6 [K₃]

14. a) Elaborate in detail the anatomical features of a nephron with a neat, labeled diagram. 10 CO3 [K₂]
 b) Write a short note on the exchange of gases between the blood and lungs. 6 CO3 [K₂]
15. a) Describe the structure of a neuron with a neat, labeled sketch. 10 CO4 [K₂]
 b) Observe the depicted image related to a leakage Na⁺ and K⁺ ion channel. 6 CO4 [K₃]



Assume that its a truncated (malfunctioned) channel and a greater amount of Na⁺ ions are leaking into the membrane from the outside. What could be the nature of the membrane potential [action or resting]? Write its characteristic features.

16. a) Discuss the various anatomical changes of uterus with special reference to menstrual phase as a part of menstrual cycle. 10 CO5 [K₂]
 b) Observe the depicted image that mimic a human spermatogenesis process. Assume it happens in a higher evolved human species existing in the planet Jupiter. Write the correct answers for the labeled parts "x", "y", "A", "B", "C" and "D". 6 CO5 [K₃]

