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CS/B.TECH.(BME)/SEM-8/BME-803B/2012 2012

BIOLOGICAL CONTROL SYSTEM

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

 $10 \times 1 = 10$

- (i) $\rm O_2$ carrying capacity of Hb is reduced at pH of
 - a) 7·4

b) 7·2

c) 7·0

- d) 7.8.
- (ii) Atrial natriuretic peptide helps in the correction of
 - a) Hypertension
- b) Hypotension
- c) Hypovolemia
- d) Hypervolemia.
- (iii) H_2CO_3 formation from H_2O and CO_2 is helped by
 - a) Carbonic anhydrase
- b) Isomerase
- c) Phosphatase
- d) Lypase.

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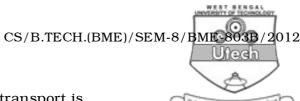


- (iv) In hypothalamus shievering centre is
 - a) Posterior group of nuclei
 - b) Anterior group of nuclei
 - c) NTS
 - d) Vaso motor centre.
- (v) Non hormonal anti-insulin is
 - a) Renin

- b) Angiotensin
- c) Insulin antibody
- d) IgG.
- (vi) Renal threshold value is
 - a) 120 mg/100 ml
- b) 175 g/100 ml
- c) 180 mg/100 ml
- d) 145 g/100 ml.
- (vii) Influence of ${\rm O}_2$ in reducing ${\rm CO}_2$ carrying capacity of blood is called

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- a) Kreb's effect
- b) Both effect
- c) CDH effect
- d) Hamberger effect.
- (viii) VMC regulates blood pressure as
 - a) Sympathetic centre
 - b) Parasympathetic centre
 - c) Both (a) and (b)
 - d) None of these.



- (ix) Primary active transport is
 - a) Energy dependent phenomenon
 - b) Energy independent phenomenon
 - c) Both (a) and (b)
 - d) None of these.
- (x) Short term control of blood pressure is achieved via
 - a) renin-angiotensin system
 - b) neural mechanism
 - c) the activity of ANP
 - d) all of these.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following.

 $3 \times 5 = 15$

- 2. What is cardiac cycle? Briefly explain the interrelation of the events in the cardiac cycle. 2+3
- 3. Define Metabolic acidosis, Renal acidosis and Respiratory acidosis. What is acidotic coma? 3 + 2
- 4. Identify the organ system component, input-output and describe the operation of the biological control system consisting of a human being reaching for an object.

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- 5. How does Donnan effect regulate ionic diffusion through semi permeable cell membrane?
- 6. Calculate the overall gain (M) if G is the forward path gain and F is the feedback path gain. What will be the sensitivity of this system? 2 + 3
- 7. How are hypervolemia and hypovolemia controlled to restore normal pressure?

GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

8. What is insulin? What are the common causes of diabetes mellitus? What do you mean by glucosuria? Briefly discuss the role of endocrines in controlling blood sugar level.

3 + 3 + 2 + 7

- 9. How does sinu-aortic reflex control blood pressure? Explain the regulatory function of hypothalamus, limbic system and cerebral cortex in blood pressure regulation. 9+6
- 10. How do RBC and pulmonary capillaries control $\rm O_2$ uptake in blood and tissues ? 7+8
- 11. Describe the regulatory process of acid-base balance. Mention the role of buffer in this process. 9+6
- 12. Describe three stage ${\rm CO}_2$ transport mechanism in an adult person.
- 13. Write the different properties of transfer function. What do you mean by 'Long Term' and 'short term' controls of blood pressure in human? Explain. 3 + 12

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