

Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (BME)/SEM-8/BME-803B/2010**

**2010**

**BIOLOGICAL CONTROL SYSTEMS**

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 )**

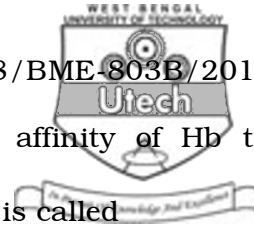
1. Choose the correct alternatives for the following :

10 × 1 = 10

i) The hormone which causes hyperglycaemia by hepatic glycogenolysis is called

- a) Insulin
- b) Glucagon
- c) Parathormone
- d) ADH.





vi) With the decrease of pH of blood, affinity of Hb to Oxygen also decreases and this effect is called

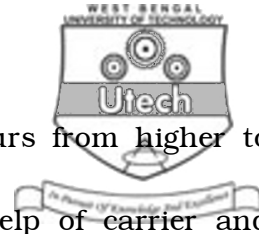
- a) Kreb's effect
- b) Douglus effect
- c) Donnan effect
- d) Bohr effect.

vii) Reabsorption of water from PCT to the peritubular space when takes place through the junction of the tubular cell, the process is termed

- a) Paracellular reabsorption
- b) Transcellular reabsorption
- c) Cellular filtration
- d) Peritubular reabsorption.

viii) Glomerular filtration rate is about

- a) 140 L/day
- b) 170 L/day
- c) 170 L/min
- d) 140 mL/min.



ix) When movement of substances occurs from higher to lower concentration but with the help of carrier and without any energy expenditure the process is called

- a) secondary active transport
  - b) endosmosis
  - c) facilitated diffusion
  - d) exosmosis.
- x) Short term control of blood pressure is achieved by
- 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. How does the concentration of 2, 3 diphosphoglyceraldehyde control the uptake of oxygen in the lungs and dissociation of it in the tissues ? 5
3. Write the regulatory process of urine concentration and volume giving emphasis on "Counter Current Multiplier System." 5
4. Describe the role of "Skin" in the human-thermoregulatory mechanism. 5
5. How do bicarbonate buffer and phosphate buffer regulate the acid-base balance of the human blood ? 5
6. Define closed loop system and open loop system with examples. 5
7. How does 'Donnan effect' maintain equilibrium in body fluid compartments ? 5



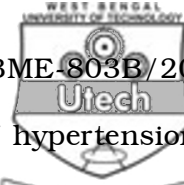
**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.

3 × 15 = 45

8. How is 3 stage CO<sub>2</sub> transport mechanism regulated in an adult human being ? 15
9. What do you mean by metabolic acidosis, respiratory acidosis, renal acidosis ? How is H<sup>+</sup> secretion in PCT and in DCT controlled to maintain constant acid-base balance in human blood ? 6 + 9
10. How does liver act as 'glucostar' ? Write the role of central nervous system, skeletal muscle, intestine & kidney in the control of blood sugar level. 5 + 10
11. What is the overall gain of a closed loop system if its open loop gain is  $G$  and feedback is  $H$  ? State and derive the stability criteria of a closed loop feedback control system. 7 + 8



12. What do you mean by 'long term control of hypertension ?

State the role of Barroreceptor reflex in the biological control of blood pressure.

8 + 7

13. Explain the role of various controlling factors which help in the uptake of  $O_2$  in the lungs and dissociation of it in the

tissues.

15

=====