



Name :

Roll No. :

Invigilator's Signature :

**CS/B.Tech/BME/SEM-8/BME-803B/2013
2013**

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)

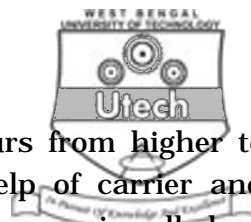
1. Choose the correct alternatives for the following : $10 \times 1 = 10$

i) O_2 carrying capacity of haemoglobin reduces during

- | | |
|--------------|------------------|
| a) alkalosis | b) acidotic coma |
| c) anaemia | d) arhythmia. |

ii) Stimulation of area causes tachycardia and hypertension

- | | |
|------------------|-----------------|
| a) limbic system | b) hypothalamus |
| c) thalamus | d) cerebellum. |



- iii) 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
- secondary active transport
 - endosmosis
 - facilitated diffusion
 - exosmosis.
- iv) Glucagon plays an important role in the control of
- blood pressure
 - body temperature
 - blood sugar
 - blood pH.
- v) Hamberger phenomenon regulates
- CO₂ transport in blood
 - O₂ transport in blood
 - nutrient transport in blood
 - excretory substance transport in blood
- vi) Counter-current multiplier exchange system is mainly controlled by
- hydrostatic pressure of glomerulus
 - medullary gradient
 - renin-angiotensin system
 - autoregulation of kidney.
- vii) Influence of O₂ in reducing CO₂ carrying capacity of blood is known as
- Bohr's effect
 - CDH effect
 - Kreb's effect
 - Donnan effect.



- viii) When glucose is produced from amino acids the process is called
- a) Glycogenolysis b) Glycogenesis
 c) Glycolysis d) Gluconeogenesis.
- ix) Glomerular filtration is favoured by
- a) colloidal osmotic tension of the capillary blood
 b) capillary hydrostatic pressure
 c) hydrostatic pressure of Bowman's capsule
 d) all of these.
- x) Design of thermoregulatory processes in human is an example of
- a) closed loop system b) open loop system
 c) both (a) and (b) d) none of these.

GROUP - B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 15

2. What are the basic components of a control system ? Name the system performance characteristics which are affected by the use of feedback. 3 + 2
3. How does liver play role in the control of blood sugar ?
4. Why is H⁺ ions secretion in DCT an important issue in regulation of acid-base balance of the body ?
5. Name the sympathetic centre of human brain that control blood pressure. How does it correct hypotension in human body ? 1 + 4
6. Explain the importance of protoporphyrin structure of haemoglobin in the regulation of O₂ uptake in blood.
7. How does kidney maintain GFR and how is renal autoregulation achieved ?



GROUP - C
(Long Answer Type Questions)

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

8. What are the differences between biological control system and engineering control system ? Why is block diagram important in control system ? Define close loop system with an example. $5 + 5 + 5$
9. How do phosphate buffer and bicarbonate buffer play role in the regulation of acid base balance ? Why are plasma proteins and haemoglobins called chief buffers of human body ? $4 + 4 + 4 + 3$
10. How do thermogenesis and thermolysis control body temperature in homeothermic human being ? Explain the role of lungs and skin in the thermoregulation. $3 + 3 + 3 + 6$
11. "Mechanism of urine formation is a combined effect of renal filtration , tubular reabsorption, secretion and acidification" — explain.
12. What are the controlling factors of O_2 uptake in blood from lungs and dissociation of O_2 from blood to tissues ?
13. What do you know about the endocrine control mechanism of 'blood sugar' ? Why is 'Liver' called 'glucostat' ? $12 + 3$
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