

**BDS FIRST PROFESSIONAL EXAMINATION 2007
PHYSIOLOGY (SEQs)
MODEL PAPER**

Total marks: 45

Time: 2 hrs 15 min

Note: Attempt all questions

Q1. What is Glycocalyx? Enumerate four important functions of carbohydrate moieties attached to outer surface of cell.

1,2**Key:**Loose carbohydrate coat on outer surface of cell. $\frac{1}{4}$

Composed of

Glycoproteins $\frac{1}{4}$ Glycolipids $\frac{1}{4}$ Proteoglycans $\frac{1}{4}$ FunctionsNegative charge repels other negative charges $\frac{1}{2}$ Attached cells with each other $\frac{1}{2}$ Act as receptor $\frac{1}{2}$ Immune reactions $\frac{1}{2}$

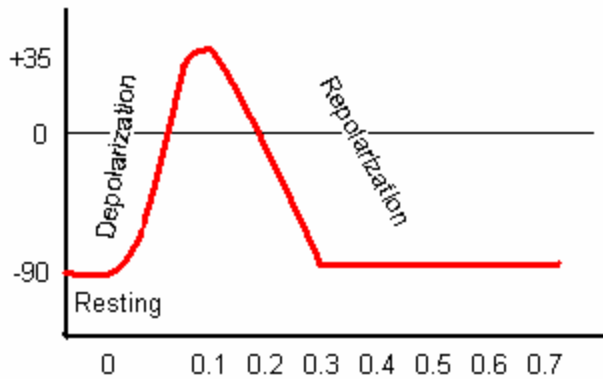
**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 14**

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Q2. Draw and Label the Action Potential in a large myelinated nerve fiber. Which ion channels are involved in its different stages? 2, 1

Key:

Draw		1
Label		1
Ion Channels		1
Depolarization	sodium channels	(½)
Repolarization	potassium channels	(½)



**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 61**

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Q3. What is walk-Along theory of skeletal muscle contraction?

3

Key:

1/3 for each (2)

1 diagram

Activation of actin filament by ca ions

Attachment of myosin cross bridges with active sites

Power stroke head tilt towards arm

Actin filament drags

Head breakes away

Head returns to extended direction Combines with new active sites

**Reference: Text Book of Medical Physiology 11th Ed.
Guyton & Hall Page 77**

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Q4. Define Cardiac Cycle. How the Pressure changes in left ventricle during different phases of cardiac cycle? 1,2

Key:

Cardiac events from beginning of one heart beat to the beginning of

next. 1/3

Duration 0.8 sec 1/3

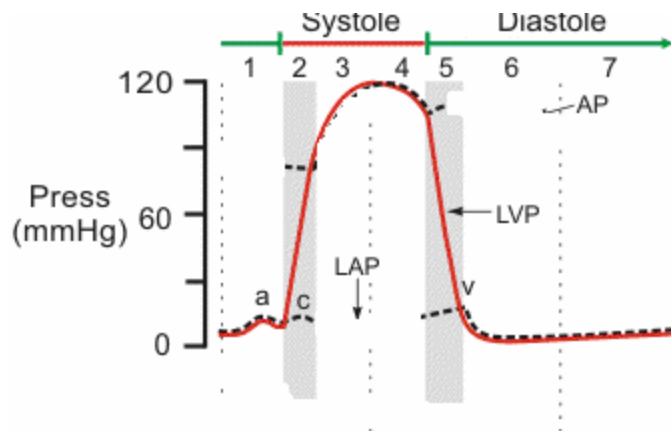
Rate 72/min 1/3

Pressure changes 2

Diagram (1)

Changes during systole (1/2)

Changes during diastole (1/2)



**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 107**

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Q5. Enumerate four rapidly acting mechanisms for Blood Pressure regulation. How Renin Angiotnsin mechanism regulates Blood Pressure? 1, 2

Key: (any four ¼ each)

Baroreceptor reflex

Chemoreceptor reflex

CNS ischemic response

Bain bridge reflex

Atrial reflex

Renin angiotensin mechanism

2

¼ each

Low BP

Renin (kidney)

Renin substrate (angiotensinogen)

Angiotensin 1

Angiotensin 11

Salt water retention by kidney

Vasoconstriction

Increased arterial pressure

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 209, 223**

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Q6. Define Micturition. What is micturition reflex? 1, 2

Key:

Def 1 (¼ each)

Process by which urinary bladder empties when it becomes filled with blood

Bladder fills progressively

Tension in it's walls rises above threshold level

Nervous reflex initiated to empties the bladder

Reflex 2 (¼ each)

Receptors stretch receptors in bladder wall

Aff pelvic nerve

Center sacral segment

Eff parasympyhetic through same nerve

Response bladder contractions

Powerfull micturition reflex

Throughg pudental nerve inhibit external sphincter

More inhibition than voluntary constrictor signals

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 311,313**

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Q7. Classify various white Blood Cells. What are the functions of neutrophils? 1, 2

Key:

Classification

A	Granulocytes	½
	Neutrophils	
	Eosinophils	
	Basophils	
B	Agranulocytes	½
	Lymphocytes	
	Monocytes	

Functions

Phagocytosis

Killing of bacteria by bactericidal agents

Oxidizing agents to kill bacteria

Second line of defence during inflammation

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 430 _34**

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Q8. Enumerate four common types of anemia. What are the effects of Anemia on circulatory system? 1, 2

KEY

Types: ¼ each

Blood lose anemia

Aplastic anemia

Megaloblastic anemia

Hemolytic anemia

Effects 2 (¼)

Dec b lood viscosity

Dec resistance to blood flow

Inc venous return

Inc cardiac output

Dec oxygen transport

Hypoxia

Dilated peripheral blood vessels

Inc pumping load on heart

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 426-27**

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Q9. What is the role of oxygen, carbon dioxide and hydrogen ions in control of respiration? 3

Key:

Oxygen

1

Peripheral chemoreceptors in aortic and carotid bodies

PO₂ when fall 60 to 30 mmHg

Dec Hb saturation with O₂ rapidly

Signals to respiratory center inc rate of respiration

CO₂ and hydrogen ions

2 (¼ each)

Directly on respiratory center

H ions primary stimulus

CO₂ cross BBB enter into

Cerebral interstitial fluid reacts with water

CO₂ + H₂O _____ H₂CO₃ _____ H + HCO₃

H ions on central chemosensitive area

Increasing RR

Weak effect on peripheral chemoreceptors

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 516_ 18**

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Q10. Define Lung Compliance. How the Surfactant increases lung compliance? 1, 2

Key:

Extent to which lungs expand for each unit increase in transpulmonary pressure ½

Normal value 200ml/cmH₂O ½

Surfactant 2 (½ each)

Surface active agent

Mixture of phospholipids, ions and proteins

Phospholipids esp Dipalmitoylphosphatidylcholin spread over water surface in alveoli

Dec surface tension among water molecules one twelveth to one half the surface tension of pure water surf.

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 473_ 74**

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Q11. What is endogenous pain control mechanism? 3

Key:

Analgesia system in brain and spinal cord

Periaqueductal gray

Periventricular areas of mesencephalon and upper pons (Enkephalin)

1

Raphe Magnus nucleus in lower pons and upper medulla(serotonin)

1

Pain inhibitory complex in dorsal horn of spinal cord (enkephalin)

1

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 602**

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Q12. Enumerate the parts of Basal Ganglia. What is their role in motor control? **1,2**

KEY

Names 1 (1/5 each)

Caudate nucleus

Putamen

Globus pallidus

Substantia nigra

Subthalamic nucleus

Functions

Cognitive control of sequence of motor pattern 1

Change the timing of movement ½

Scale the intensity of movement ½

Reference: **Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 707 -8**

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**Q13. Draw and Label Dorsal Column Medial Lemniscal Tract.
Which Sensations are transmitted by this pathway?**

2, 1

Key:

Draw and Label 2 (1 Draw, 1Label)

Sensations 1 (1/5 each)

Fine touch

Vibration

Position

Pressure

Move against skin

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 588**

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Q14. Enumerate the Hormones of Adrenal Cortex. What are the effects of cortisol on protein metabolism? 1, 2

Key:

Enumerate 1 (1/3 each)

Glucocorticoids (cortisol)

Mineralocorticoid (aldosteron)

Adrenal androgens

Effects 2 (1/3 each)

Dec cellular proteins

Dec muscle proteins

Inc liver and plasma proteins

Inc blood amino acids

Dec AA transport to extrahepatic tissues

Inc AA transport to hepatic cells

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 952**

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Q15. Which changes occur during Pharyngeal stage of swallowing? **3**

KEY (1/3 each)

Soft palate pulled upwards to close posterior nares

Palatopharyngeal folds approximated

Vocal cords approximate

Larynx pulled upwards and anteriorly by neck muscles

Upper esophageal sphincter relax

Contraction of pharyngeal muscles

Trachea closed

Esophagus opened

Peristaltic wave of pharynx occurs

**Reference: Text Book of Medical Physiology 11th Ed
Guyton & Hall Page 782**