



KLE ACADEMY OF HIGHER EDUCATION AND RESEARCH

Physiology Paper 1 [PHY1]

Marks: 100

Duration: 180 mins.

MCQ 20 X 1 = 20

Answer all the questions.

Section Duration: 30 mins

- 1 Cell shape and mobility are provided by the following (1)
- | | | | |
|------------------|------------|--------------|-----------------|
| 1) Smooth muscle | 2) Nucleus | 3) Ribosomes | 4) Cytoskeleton |
|------------------|------------|--------------|-----------------|
-
- 2 Normal cell volume and pressure depends upon (1)
- | | | | |
|------------------------|---------------------------|---|--|
| 1) Gibbs-Donnan effect | 2) Operation of Na-K pump | 3) Asymmetrical distribution of ions across cell membrane | 4) Presence of more osmotically active particles in the cell |
|------------------------|---------------------------|---|--|
-
- 3 What is the appropriate treatment for an infant born with severe Erythroblastosis fetalis? (1)
- | | | | |
|---|------------------------------------|---|---|
| 1) Passive immunization with anti-Rh(D) immuno globulin | 2) Immunization with Rh(D) antigen | 3) Exchange transfusion with Rh(D)-positive blood | 4) Exchange transfusion with Rh(D)-negative blood |
|---|------------------------------------|---|---|
-
- 4 A 6 year old boy bruises easily and had previously bleeding gums. The maternal grandfather also has a bleeding disorder. You suspect the deficiency of (1)
- | | | | |
|--------------|----------------|-------------|----------------|
| 1) Factor II | 2) Factor VIII | 3) Factor X | 4) Factor XIII |
|--------------|----------------|-------------|----------------|
-
- 5 Which of the following is **NOT** a characteristic of Innate immunity? (1)
- | | | | |
|--------------------------|-----------------------|--------------------|-----------------------------------|
| 1) Non-specific response | 2) Immediate response | 3) Memory response | 4) Physical and chemical barriers |
|--------------------------|-----------------------|--------------------|-----------------------------------|
-
- 6 This respiratory control center tends to terminate inspiration (1)
- | | | | |
|---------------------|-----------------------|---------------------------------|--------------------------------|
| 1) Apneustic center | 2) Pneumotaxic center | 3) Medullary inspiratory center | 4) Medullary expiratory center |
|---------------------|-----------------------|---------------------------------|--------------------------------|
-
- 7 Lung diffusion capacity is measured with (1)
- | | | | |
|--------------------|-------|---------------------|-------------------|
| 1) CO ₂ | 2) CO | 3) H ₂ O | 4) N ₂ |
|--------------------|-------|---------------------|-------------------|
-
- 8 Chloride shift causes (1)
- | | | | |
|---|---|--|---|
| 1) Decreased Intracellular Chloride and decreased venous RBC volume | 2) Decreased Intracellular Chloride and increased venous RBC volume | 3) Decreased Intracellular Chloride and No change in venous RBC volume | 4) Increased Intracellular Chloride and Increased venous RBC volume |
|---|---|--|---|
-
- 9 A 78-year-old man who smoked 60 cigarettes per day for 55 years reports shortness of breath. The patient is diagnosed with chronic pulmonary emphysema. Which set of changes are present in this man compared with a healthy nonsmoker? (1)
- | | | | |
|-------------------------------------|------------------------------------|-----------------------------------|------------------------------------|
| 1) Decreased pulmonary compliance , | 2) Decreased pulmonary compliance, | 3) Decreased pulmonary compliance | 4) Increased pulmonary compliance, |
|-------------------------------------|------------------------------------|-----------------------------------|------------------------------------|

decreased lung elastic recoil and Decreased Total lung capacity		decreased lung elastic recoil and increased Total lung capacity		Increased lung elastic recoil and increased Total lung capacity		decreased lung elastic recoil and increased Total lung capacity
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10

Stimulation of parasympathetic nerve to GIT produces

1) Contraction of sphincters	2) Inhibition of secretion from stomach	3) Inhibition of intestinal secretions	4) Increase in motility and tone
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(1)

11

Pancreatic juice rich in water and bicarbonate but poor in enzymes is secreted in response to

1) Pancreozymin	2) Cholecystokinin (CCK)	3) Secretin	4) Enterokinase
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(1)

12

A woman attending OPD complains of frequent pale coloured stools On examination serum bilirubin is 6mg/100ml. Urine contains bile salts and no urobilinogen. Van den Bergh direct test was highly positive .The probable diagnosis is

1) Haemolytic jaundice	2) Obstructive jaundice	3) Physiological jaundice	4) Achoric jaundice
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(1)

13

Normal glomerular filtration rate in adults is

1) 100 ml / min	2) 125 ml / min	3) 150 ml / min	4) 175 ml / min
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(1)

14

A patient due to lack of antidiuretic hormone has Diabetes Insipidus. Identify the correct statement

1) No change in plasma osmolarity and plasma Sodium concentration and decrease in plasma Renin secretion	2) No change in plasma osmolarity and plasma Sodium concentration and increase in Renin secretion	3) Increase in plasma osmolarity ,increase in plasma Sodium concentration and increase in Renin secretion	4) Increase in plasma osmolarity ,decrease in plasma Sodium concentration and no change in Renin secretion
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(1)

15

Marey's law denotes relationship between heart rate and

1) Blood volume	2) Blood pressure	3) Force of contraction	4) Conductivity
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(1)

16

A 50 year old patient came to emergency with signs and symptoms of hypovolumic shock .The baroreceptor stimulation produces

1) Decrease in heart rate & BP	2) Increase in heart rate & BP	3) Decreased cardiac contractility	4) Decreased stroke volume
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(1)

17

Pressure on Carotid sinus causes

1) Hyperpnoea	2) Bradycardia	3) Tachycardia	4) Dyspnoea
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(1)

18

Which statement about cardiac muscle is accurate?

1) T-tubules of cardiac muscle can store much less Calcium than the T-tubules in skeletal muscle	2) Strength and contraction of cardiac muscle depends on the amount of Calcium surrounding cardiac myocytes	3) In cardiac muscle, initiation of the action potential causes an immediate opening of slow Calcium channels	4) Cardiac muscle repolarization is caused by opening of Sodium channels
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(1)

19

Which event is associated with the **first** heart sound?

1) Closing of the aortic valve	2) Inrushing of blood into the ventricles during diastole	3) Closing of the A-V valves	4) Opening of the A-V valves
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(1)

20

In brain ischemia, systemic blood pressure rises, this is called as

1)	Baroreceptor reflex	2)	Cushings reflex	3)	Bainbridge reflex	4)	Bezold-Jarish reflex
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(1)

Long Essay 10 X 2 = 20

Answer all the questions.

21

A person was travelling in desert is deprived with water for 24 hours.

- Describe the mechanisms of concentration of urine in this person. (6 marks)
- Explain Counter Current Exchange System (4 marks)

(10)

22

Define Cardiac cycle. Explain with the help of a diagram the mechanical and pressure changes during cardiac cycle. (2+8)

(10)

Short Essay Questions 9 X 5 = 45

Answer all the questions.

23

Define Homeostasis. Explain negative feedback mechanism with **one** example.

(5)

24

Classification and functions of Immunoglobulins.

(5)

25

A 34 year old female presented with two day history of ecchymoses, petechiae, and hematuria. She had noted headaches, nausea and increasing dysphoria over the past week. Physical Examination showed scattered ecchymoses and petechiae. She appeared anxious and agitated CBC SHOWED
1) RBC 2.38 millions/cmm 2) Hb 6.6 g/dL 3) MCV 77.5 fL 4) MCH 27.7 pg 5) MCHC 35.8 g/dL 6) WBC 16.9 cell/cmm 7) Platelets = 80,000 cells /cubmm.

Questions:

- What morphologic alterations are seen in this blood smear field and mention the normal values (2 marks)
- What is the most likely diagnosis & cause for the petechial haemorrhage (1 mark)
- Mention the functions of the platelets (2 marks)

(5)

26

Describe the transport of CO₂ in the blood.

(5)

27

A patient was admitted with history of difficulty in breathing .On examination he had normal arterial PO₂ ,normal O₂ content and normal arterial O₂ saturation of Hb. The A-V PO₂ difference was 10ml % and a diagnosis of congestive cardiac failure was made.

- Name the type of hypoxia in this case (1mark)
- Define and classify hypoxia (2marks)
- Explain the physiological basis of hypoxia seen in congestive cardiac failure (2marks)

(5)

28

Describe the phases of gastric juice secretion.

(5)

29

A 40 year old female underwent abdominal surgery where a large degree of ileum was resected following which she developed large bulky stools and diarrhoea which was unrelenting. Questions;

- What is the clinical terminology assigned to large bulky stools. (1 mark),
- What is the physiological basis of ileal resection leading to large bulky stools.(2 marks)
- What is the role of ileal resection in leading to diarrhoea.(2 marks)

(5)

30

Describe the mechanism of reabsorption of Glucose in proximal convoluted tubule of nephron. Add a note on Tubular maximum for Glucose. (3+2)

(5)

31

Discuss the ventricular action potential in terms of: i) Phases ii) Ionic basis of each phase. (2+3)

(5)

Short Answer Questions 3 X 5 = 15

Answer all the questions.

32			Explain the role of Sodium and Glucose in oral rehydration fluid.	(3)
33			Explain functions of Plasma Proteins.	(3)
34			Explain cause and effect of Dysbarism and Infant respiratory distress syndrome.	(3)
35			Explain Post Prandial Alkaline Tide.	(3)
36			Discuss whether students benefit from early clinical exposure to have empathetic responses in their training for clinical postings.	(3)

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Phosphate and Calcium level and Tetany		Phosphate & Calcium level and Tetanus		increased muscular excitability & a characteristic spasm of the muscle of the upper extremity		Calcium levels and bone demineralization	
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12

The primary function of basal ganglia is

1) Coordination of movements	2) Planning and programming of voluntary movements	3) Neuroendocrine control	4) Memory
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(1)

13

A characteristic feature of cerebellar disease is

1) Increased muscle tone	2) Resting tremors	3) Intention tremors	4) Festinant gait
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(1)

14

One of the following is an important function of Thalamus

1) A major sensory relay station	2) Planning and programming of movements	3) Coordination of movements	4) Control of circadian rhythm
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(1)

15

Which of the following neurotransmitters has always an inhibitory action in CNS?

1) Glutamate	2) GABA	3) Acetylcholine	4) Adrenaline
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(1)

16

An important function of limbic system is

1) Control of hunger and feeding	2) Control of circadian rhythm	3) Control of emotions of rage and fear	4) Control of sleep-wake cycle
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(1)

17

A 17-year-old boy sustains serious head and neck trauma during a football game. Physical examination shows a positive Babinski sign. What part of the brain has been damaged in this boy

1) Anterior motor neurons	2) Cerebellum	3) Corticospinal tract	4) Premotor cortex
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(1)

18

A 85 year old man complains of inability to recall long-term memories from the past. Which of the following brain regions leads to retrograde amnesia when damaged?

1) Hippocampus	2) Dentate gyrus	3) Amygdaloid complex	4) Mammillary nuclei of hypothalamus
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(1)

19

In a nerve fibre, the process of depolarization is due to

1) Increased Na ⁺ conductance	2) Decreased K ⁺ conductance	3) Decreased chloride conductance	4) Decreased Na ⁺ conductance
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(1)

20

A 56-year-old man sees a neurologist because of weakness in his legs that improves over the course of the day or with exercise. Extracellular electrical recordings from a single skeletal muscle fiber reveal normal miniature end plate potentials. Low-frequency electrical stimulation of the motor neuron, however, elicits an abnormally small depolarization of the muscle fibers. The amplitude of the depolarization is increased after exercise. A preliminary diagnosis is confirmed by the presence of which of the following?

1) Antibodies against the acetylcholine receptor	2) Antibodies against the voltage-sensitive Ca ⁺⁺ channel	3) Relatively few vesicles in the presynaptic terminal	4) Residual acetylcholine in the neuromuscular junction
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(1)

Long Essay 10 X 2 = 20

Answer all the questions.

21			Describe the photochemical mechanism of vision and mechanism of dark adaptation. (5+5)	(10)
22			<p>A 4-year-old child was complaining of weakness in the left upper limb, to evaluate the cause neurologist advised for nerve conduction study of nerves in the upper limb. When the technician stimulates the median nerve in the forearm, he observed weak contraction in the muscles innervated by the median nerve. Upon increasing the strength of the stimulus, the muscle contraction grew stronger</p> <p>1) Briefly explain the physiological basis for the increased force of muscle contraction upon increased strength of stimulus (2 marks)</p> <p>2) Draw a neat, labeled diagram of the Neuromuscular junction and describe the process of transmission of nerve signals across the neuromuscular junction (6 marks)</p> <p>3) Add a note on Myasthenia Gravis Syndrome (2 marks)</p>	(10)

Short Essay Questions 9 X 5 = 45

Answer all the questions.

23			Interpret the role of Hypothalamus in regulation of endocrine glands.	(5)
24			Describe the actions and regulation of Aldosterone hormone. Add a note on Aldosterone escape.	(5)
25			<p>A 28 year old female came with a history of nervousness, restlessness, tiredness, excessive sweating, palpitation, increased appetite and amenorrhea. On examination, there was tachycardia, skin was warm and moist and showed swelling of the neck anteriorly. The eyes were prominent and the lids were retracted, examination of cardia revealed that the heart was enlarged and sinus tachycardia and extra systoles were present. B.M.R was 40%, Serum cholesterol 100mg%, Basal pulse rate 120/min.</p> <p>1) What is the diagnosis ? (1 Mark)</p> <p>2) Evaluate the investigation report (2 Marks)</p> <p>3) Explain the physiological basis for the above signs and symptoms. (2 Marks)</p>	(5)
26			Explain Physiological basis of female contraceptive methods.	(5)
27			Define and explain stages of Spermatogenesis. Explain factors affecting Spermatogenesis. (2+3)	(5)
28			<p>A 50-year-old man with a stooped posture consulting a neurologist was found to have resting coarse tremors which disappeared on voluntary movement, expressionless face and a short shuffling gait.</p> <p>1) What is the diagnosis? (1mark)</p> <p>2) Explain the pathophysiology of the case (3 marks)</p> <p>3)What is the treatment advocated in this case? (1 mark)</p>	(5)
29			Describe the properties of sensory receptors.	(5)
30			What is the Final Common Pathway? Explain the differences between upper and lower motor neuron lesions.	(5)
31			Describe the mechanism of temperature regulation on exposure to hot environment.	(5)

Short Answer Questions 3 X 5 = 15

Answer all the questions.

32			Enumerate the functions of Vasopressin.	(3)
33			Describe Corpus Luteum with its significance.	(3)
34			Draw a neat-labeled diagram of pathway for stretch reflex.	(3)
35			Compare isometric and isotonic contraction.	(3)
36			Name the factors that can facilitate effective communication in a doctor patient relationship.	(3)

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