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POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

POSTGRADUATE DIPLOMA IN MEDICAL PHYSIOLOGY
EXAMINATION – APRIL 2015

FOUNDATION MODULE

Date :- 25th April 2015

Time :- 9.30 a.m. – 10.30 a.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

Answer all three (03) questions.

Answer each question in a separate book.

1. Using diagrams, describe the sequence of events by which the following hormones exert a cellular response.
 - 1.1. Adrenalin (50 %)
 - 1.2. Glucocorticoids (50%)

2. A healthy adult man weighing 70kg is infused 500ml of 5% dextrose in 10 minutes.
 - 2.1. Describe the body fluid distribution in a 70kg healthy adult male. (20%)
 - 2.2. State how the infused fluid is distributed in this man. (40%)
 - 2.3. Outline the role of proteins in passive transport across the cell membrane. (40%)

3.
 - 3.1. Name two (02) key regulatory molecules that determine a cell's progress through the cell cycle. (20%)
 - 3.2. Compare and contrast cell necrosis and cell apoptosis. (30%)
 - 3.3. Name three (03) mechanisms in apoptosis. (30%)
 - 3.4. Briefly explain the function of helicases and SSB protein in DNA replication. (20%)

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EXAMINATION – APRIL 2015

HAEMATOLOGY MODULE

Date :- 25th April 2015

Time :- 12.00 noon – 1.00 p.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

Answer all three (03) questions.
Answer each question in a separate book.

1. A 72 year old female presents to a clinic with a 6 week history of gradually increasing tiredness and shortness of breath. The investigations showed the following.

Haemoglobin concentration	-	8.6 g/dL
Packed cell volume	-	25%
Red cell count	-	$3.8 \times 10^{12}/L$
White cell count	-	$6.7 \times 10^9/L$
Platelet count	-	$450 \times 10^9/L$

- 1.1. Calculate the mean corpuscular volume (MCV) and mean corpuscular haemoglobin (MCH) and state the possible haematological abnormality based on those values. (30%)
- 1.2. State two (02) possible **causes** for the abnormality in 1.1. (10%)
- 1.3. Explain the underlying pathophysiological mechanism/s for the above causes. (30%)
- 1.4. Explain giving reasons, what further investigations should be performed to arrive at a definite diagnosis. (30%)

Contd.../2-

2.

2.1. Compare and contrast innate and acquired (adaptive) immunity under the following sections :

2.1.1. Cellular components

2.1.2. Chemical components

2.1.3. Characteristics of the immune responses

(50%)

2.2. Explain the role of the endothelium in maintaining the fluidity of blood.

(50%)

3. A newborn baby developed yellowish discolouration of skin and sclera on the first day of life. On investigation he was found to have indirect hyperbilirubinaemia. The mother had a previous home delivery.

This baby's blood group was O Rh positive and the mother's blood group was A Rh negative.

3.1. Compare the structure of the ABO blood group antigens present on the red cell surface of mother and the baby (30%)

3.2. Explain the pathophysiological basis for the indirect hyperbilirubinaemia in this baby. (50%)

3.3. Explain giving reasons how this condition could have prevented. (20%)

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EXAMINATION – APRIL 2015

CARDIOVASCULAR MODULE

Date :- 25th April 2015

Time :- 3.00 p.m. – 4.00 p.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

Answer all three (03) questions.

Answer each question in a separate book.

1. A 60 year-old male patient was admitted to the medical emergency unit due to difficulty in breathing when lying down. His pulse rate was 105 beats per minute and blood pressure was 85/60 mmHg. He has a past medical history of myocardial infarction and hypertension.

1.1. Name the most probable cardiac dysfunction in the above patient and give reasons for your answer. (30 %)

1.2. Explain the physiological basis for his symptoms and signs. (70%)

2. A patient was admitted to the emergency unit following a road traffic accident. He had multiple external injuries. He was thirsty and complained of pain in the right thigh.

On examination: blood pressure 110/70 mmHg, pulse rate 140/min, cold pale extremities

On investigations: Hb -14g/dl, PCV 42%. Patient was diagnosed to be in shock.

2.1. Give physiological explanations for

2.1.1. his BP & pulse

2.1.2. presence of cold and pale extremities

2.1.3. presence of normal Hb % and PCV

2.1.4. presence of thirst

(75%)

2.2. State five hormones that are elevated in this patient during this condition .

(25%)

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3.
 - 3.1. Draw a labeled diagram of the pressure – volume loop of the left ventricle and name the phases. (25%)
 - 3.2. State five factors that increase the left ventricular end-diastolic volume. (20%)
 - 3.3. State three factors that increase the left ventricular end-systolic volume. (15%)
 - 3.4. In a patient with a denervated heart (eg. transplanted heart), the heart rate increases with exercise. Explain the physiological basis of this observation. (40%)

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EXAMINATION – APRIL 2015

RESPIRATORY MODULE

Date :- 26th April 2015

Time :- 11.00 a.m. – 12.00 noon

STRUCTURED ESSAY QUESTION (SEQ) PAPER

Answer all three (03) questions.

Answer each question in a separate book.

1.
 - 1.1. Define lung compliance. (20%)
 - 1.2. Explain the role of surfactant in maintaining alveolar stability. (40%)
 - 1.3. Explain what happens to lung compliance in
 - 1.3.1. emphysema. (20%)
 - 1.3.2. lung fibrosis. (20%)
2. A trained mountaineer ascends to an altitude of 3000 m over 72 hours.
 - 2.1. List the physiological changes in the following that would be observed at 3000 m.
 - 2.1.1. Respiratory rate. (10%)
 - 2.1.2. Oxygen-haemoglobin dissociation curve. (10%)
 - 2.2. Explain the mechanisms of the changes that you listed in 2.1.1 and 2.1.2. (60%)
 - 2.3. List four (04) other long-term effects of living at high altitude. (20%)
3. Explain the pathophysiological basis of the following :
 - 3.1. A patient with an ascending motor neuropathy develops type 2 respiratory failure. (50%)
 - 3.2. Treatment with high flow oxygen fails to correct hypoxaemia in a patient with ventricular septal defect. (50%)