POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO

POSTGRADUATE DIPLOMA IN MEDICAL PHYSIOLOGY
EXAMINATOIN – MAY 2019

FOUNDATION MODULE

Date:- 25th May 2019 **Time :-** 10.00 a.m. – 11.00 a.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

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

1.

1.1. Compare mitosis with meiosis. (50%)

1.2. Outline the mechanism of action of epinephrine via beta adrenoceptors. (50%)

2.

2.1. Define the following terms: (30%)

2.1.1. Chromatin

2.1.2. Histones

2.1.3. Linker DNA

2.2. Briefly explain the process of DNA replication. (70%)

3.

3.1. Outline the following transport mechanisms including examples in your answer.

3.1.1. Primary active transport (25%)

3.1.2. Secondary active transport (25%)

3.2. Outline the distribution of fluid following the intravenous infusion of 1 Litre of 5% dextrose to a healthy adult. (50%)

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EXAMINATOIN – MAY 2019

HAEMATOLOGY MODULE

Date:- 25th May 2019 **Time :-** 1.00 p.m. – 2.00 p.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

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

1. A 65- year- old postmenopausal woman complained of undue tiredness. She had a history of bleeding per rectum for 6 months.

   The haematological indices were as follows:

Haemoglobin	8.0 g /dl	(11.5 - 13.5)
RBC count	3.8 x 10^{12}/L	(3.9- 5.6)
Packed cell volume	27%	(36 - 48)
MCV	71 fl	(80 -95)
MCH	21 pg	(27 - 34)

1.1. State the haematological diagnosis of this patient. (10%)

1.2. Explain how the interpretation of the above findings helped you to arrive at the diagnosis stated in 1.1. (50%)

1.3. Giving reasons, state three (03) other **haematological investigations** that would help to determine the aetiology of the blood disorder stated in 1.1. (30%)

1.4. State the reason for the undue tiredness in this patient. (10%)

Contd...../2-

2. Describe the role of the following:

2.1. Low dose aspirin in the prevention of coronary artery thrombosis. (50%)

2.2. Lymphocytes in cell-mediated immunity. (50%)

3.

3.1. A patient with bacterial septicaemia, had severe bleeding from venepuncture sites in the body.

Investigations showed the following:

Platelet count	60 000/mm^3	(150,000 - 400,000/mm^3)
Prothrombin time	30 seconds	(control 16 seconds)
APTT	45 seconds	(24 – 31 seconds)

Elevated Fibrinogen degradation product (FDP) levels

3.1.1. State the possible bleeding disorder. (10%)

3.1.2. Explain, giving reasons, how you arrived at the diagnosis stated in 3.1.1. (60%)

3.2. Explain the physiological basis for the use of heparin as an anticoagulant drug (30%)

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EXAMINATOIN – MAY 2019

CARDIOVASCULAR PHYSIOLOGY

Date:- 25th May 2019 **Time :-** 3.15 p.m. – 4.15 p.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

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

1.

1.1. State the Starling law of the heart. (10%)

1.2. Explain the term 'contractility' of the heart. (10%)

1.3. Explain how the operation of the following helps in increasing the cardiac output during exercise:

1.3.1. Starling law of the heart (30%)

1.3.2. change in the contractility of heart (20%)

1.3.3. changes in the peripheral circulation (30%)

Contd..../2-

2. A 55-year-old man developed sudden onset of shortness of breath following an acute anterior myocardial infarction.

   The following were detected on examination:

Blood pressure	90/60 mmHg
Respiratory rate	30 breaths/minute
Bilateral fine crepitations in lung bases	

   He was treated with oxygen and intravenous furosemide.

2.1. In this patient, explain the physiological basis for the

   2.1.1. shortness of breath. (40%)

   2.1.2. change observed in the systolic blood pressure. (30%)

2.2. Explain the application of Law of Laplace in the cardiovascular system giving one appropriate clinical example. (30%)

3.

3.1. List four (04) local vasodilator metabolites. (10%)

3.2. Describe the role of nitric oxide on vascular tone

   3.2.1. as a direct mediator. (15%)

   3.2.2. as a mediator of other substances. (15%)

3.3. List four (04) hormones each that cause

   3.3.1. vasodilation (10%)

   3.3.2. vasoconstriction (10%)

3.4. Describe the regulatory mechanisms that maintain the systemic blood pressure within the normal range when a healthy person stands up from supine position. (40%)

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EXAMINATOIN – MAY 2019

RESPIRATORY PHYSIOLOGY

Date:- 26th May 2019 **Time :-** 10.00 a.m. – 11.00 a.m.

STRUCTURED ESSAY QUESTION (SEQ) PAPER

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

1.

1.1.

1.1.1. Draw and label a diagram (graph) comparing lung compliance of a healthy person with a patient with lung fibrosis. (20%)

1.1.2. Explain the basis for the change in lung compliance in the patient with pulmonary fibrosis. (20%)

1.2. Describe the term 'work of breathing" and state why the "work of breathing" increases in a patient with lung fibrosis. (30%)

1.3. Explain the pathophysiological basis of hypoxia in a patient with lung fibrosis. (30%)

2.

2.1. Describe the normal oxygen-haemoglobin dissociation curve with the aid of a clearly labelled diagram. (30%)

2.2. Discuss the shifts that could occur in P_{50} of the oxygen-haemoglobin dissociation curve in

2.1.1. vigorous isotonic exercise (15%)

2.1.2. ascending to an altitude of 3000 m (25%)

2.3. Describe the modes of carbon dioxide transport in blood. (30%)

Contd..../2-

3.

3.1. State the reasons for the decline observed in the PO_2 in inspired air as it reaches the alveoli. (20%)

3.2. Define the terms:

3.2.1. Alveolar dead space (10%)

3.2.2. Alveolar shunt (10%)

3.3. Explain how V/Q mismatch interferes with arterial oxygenation, giving appropriate clinical examples. (60%)