

POSTGRADUATE INSTITUTE OF MEDICINE
UNIVERSITY OF COLOMBO
POSTGRADUATE DIPLOMA IN MEDICAL PHYSIOLOGY
EXAMINATION – FEBRUARY 2021

STRUCTURED ESSAY QUESTION (SEQ) PAPER

Date :- 20th February 2021

Time:- 10.15 – 11.15 a.m.

FOUNDATION MODULE

Answer all three (03) questions.

Answer each question in a separate book.

1.
 - 1.1. Write down the main steps that you need to follow to make a recombinant bacterium. (40%)
 - 1.2. Name four (04) applications of recombinant DNA technology in medicine. (20%)
 - 1.3. What are the three (03) main steps in the polymerase chain reaction (PCR)? (15%)
 - 1.4. Write five (05) applications of PCR. (25%)
2.
 - 2.1. Explain the importance of the following in signal transduction.
 - 2.1.1. Intracellular receptors (25%)
 - 2.1.2. GTP binding proteins (G proteins) (25%)
 - 2.2.
 - 2.2.1. Outline the distribution of body water in a 60 kg healthy adult man. (30%)
 - 2.2.2. Outline the distribution of 500 mL of normal saline in an adult. (20%)
3.
 - 3.1.
 - 3.1.1. Draw a diagram of the cell cycle and briefly outline the events taking place in each stage. (30%)
 - 3.1.2. Describe the stages of mitosis (40%)
 - 3.2. Describe the transport of glucose across a cell membrane. (30%)

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RENAL PHYSIOLOGY

Answer **all three (03)** questions.

Answer each question in a separate book

1.

1.1 A 17-year-old healthy boy develops features of heat exhaustion and dehydration after exerting in very hot weather. Explain the physiological basis of passing a low volume of urine in this situation. (60 %)

1.2 He was treated with oral rehydration solution, diluted in double the volume of water recommended. Explain the physiological basis of this treatment in this boy. (40 %)

2.

2.1. Define renal clearance of a substance and state how it is calculated. (25 %)

2.2 Explain the physiological basis of using creatinine clearance to assess renal function. (35 %)

2.3 Explain the role of glomerulotubular balance in sodium reabsorption by the kidney. (40 %)

3.

3.1 Explain the role of urinary buffers in acidification of urine. (30 %)

3.2 Compare the diuretic action of thiazides with that of spironolactone. (35 %)

3.3 Explain the pathophysiological basis of a haemoglobin concentration of 9g/dL, in a patient with chronic kidney disease (35 %)

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Time : 10.15 a.m. – 11.15 a.m.

REPRODUCTIVE PHYSIOLOGY

Answer **all three (03)** questions.

Answer each question in a separate book

1.

1.1 Describe the changes in the endometrium during the pre-ovulatory phase of the menstrual cycle (30 %)

1.2 Explain the physiological basis of the following

1.2.1 Maintaining a basal body temperature chart to identify ovulation (35 %)

1.2.2 Measurement of FSH to confirm premature menopause (35 %)

2.

2.1 Describe the hypothalamo-pituitary-testicular axis (H-P-T-a). (60%)

2.2 List two (02) exogenous agents that can damage the regulation of H-P-T-a (10%)

2.3 Outline the possible mechanism of damage to the H-P-T-a by one (01) of the agents mentioned in 2.2 (30%)

3

3.1 Name the principal hormone responsible for the expulsion of uterine contents during labour (10%)

3.2 Describe the physiological basis of the above mentioned hormone in facilitating labour (60%)

3.3 Describe the role of hormones in milk synthesis and ejection (30%)

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STRUCTURED ESSAY QUESTION (SEQ) PAPER

Date: 21st February 2021

Time : 12.30 p.m. – 1.30 p.m.

NEUROPHYSIOLOGY II

Answer **all three (03)** questions.

Answer each question in a separate book

1.

1.1 Compare and contrast rapid eye movement sleep with slow wave sleep.
(50 marks)

1.2 Cerebellar disorders may cause speech difficulty. Explain the pathophysiological basis of this observation.
(50 marks)

2.

2.1 Explain the role of prefrontal cortical region in higher functions. (50 marks)

2.2 Explain the pathophysiological basis of anosmia seen in patients with an upper respiratory tract infection. (50 marks)

3.

3.1 Explain the physiological basis of the visual loss associated with patients with pituitary tumours. (50 marks)

3.2 Explain the “place principle” in auditory perception. (50 marks)

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STRUCTURED ESSAY QUESTION (SEQ) PAPER

Date :- 21st February 2021

Time:- 3.15 p.m. – 4.15 p.m.

ENDOCRINE PHYSIOLOGY

Answer all three (03) questions.

Answer each question in a separate book.

1. A 20-year-old woman presented complaining of change in appearance. She had difficulty in getting up from squatting position and noted that she bruised often. She was recently diagnosed with diabetes. On examination, she had a round face, buffalo hump, central obesity and purple abdominal striae.
 - 1.1. What is the most probable diagnosis? (10%)
 - 1.2. Explain the physiological basis for the following:
 - 1.2.1. Easy bruising and purple striae (30%)
 - 1.2.2. Difficulty in getting up from squatting position (30%)
 - 1.2.3. Diabetes (30%)

2. A 3-day-old neonate developed feeding difficulties, constipation and a hoarse cry. His TSH was 60 mU/L (Reference range 1.0-39).
 - 2.1. What is the diagnosis? (10%)
 - 2.2. Explain how the above investigation finding helps in the diagnosis. (30%)
 - 2.3. Explain the physiological basis of treating this condition early to prevent short stature and mental retardation. (60%)

3.
 - 3.1. List three (03) hormones regulating serum calcium level. (15%)
 - 3.2. Explain how serum calcium level is regulated in hypocalcaemia. (70%)
 - 3.3. Explain the physiological basis of tetany in hypocalcaemia. (15%)