CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN BIOCHEMISTRY

BIOC 424: BIOCHEMICAL ENDOCRINOLOGY

STREAMS: BSC. BIOC **TIME: 2 HOURS**

DAY/DATE: MONDAY 14/04/2025 **2.30 P.M. – 4.30 P.M.**

INSTRUCTIONS

- **Answer Question ONE and Any other TWO Questions**

Questions

Question 1 (Compulsory) (30 marks)

a) Briefly discuss the classification of hormones based on their chemical nature, providing one example for each class. (4 marks)

b) Explain how the hypothalamus regulates pituitary hormone secretion, using the example of T3 and T4 hormones. (5 marks)

c) Using Calcium as an example, describe the role of second messengers in the action of peptide hormones. (6 marks)

d) A 30-year-old woman presents with symptoms of fatigue, weight gain, and cold intolerance. Laboratory tests reveal low levels of thyroxine (T4) and elevated thyroid-stimulating hormone (TSH).

   i. Explain the biochemical basis of her condition in relation to endocrine feedback mechanisms. (3 marks)

   ii. Suggest a possible treatment approach and its biochemical rationale. (2 marks)

e) Discuss the role of prostaglandins as paracrine hormones in inflammatory processes. (5 marks)

f) Discuss the role of juvenile hormones in the life cycle of insects and their potential application in insect research. (5 marks)

Question 2 (20 marks)

Compare the structure, biosynthesis, secretion, and physiological roles of the following hormones in maintaining blood glucose homeostasis and the consequences of their dysregulation.

a) Insulin (10 marks)

b) Glucagon (10 marks)

Question 3 (20 marks)

Explain the difference between the mode of action of Group I and Group II hormones, including a comparative summary of the two groups of hormones

a) Group I hormones (10 marks)

b) Group II hormones (10 marks)

Question 4 (20 marks)

Describe the biochemical regulation of the menstrual cycle under following aspects:

a) The phases of the menstrual cycle and the hormonal changes associated with each phase. (7 marks)

b) The roles of estrogen and progesterone in endometrial changes. (6 marks)

c) The feedback mechanisms involving the hypothalamic-pituitary-gonadal (HPG) axis. (7 marks)

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