# NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

## FACULTY OF MEDICINE

## DIVISION OF BASIC MEDICAL SCIENCES

**BACHELOR OF MEDICINE AND BACHELOR OF SURGERY DEGREE**
**PART I EXAMINATIONS**

**MBM 1203** : **PHYSIOLOGY PAPER II**

**DATE** : **JUNE 2013**

**TIME** : **3 HOURS**

**Instructions to Candidates**

**Answer all questions in the answer booklet provided.**

---

1. Neural and hormonal control of the gastrointestinal system is divisible into three phases. Explain this statement. (25)

2. The table below displays data from 2 patients.

| | **Patient A** | **Patient B** | **Normal values** |
|---|---|---|---|
| Creatinine clearance (ml/min) | 30 | - | 125 |
| Plasma urea (mmol/L) | 30 | 30 | <8.0 |
| Plasma creatinine (µmol/L) | 500 | 100 | <100 |
| Urine volume (ml/hr) | 50 | 30 | - |
| Urine creatinine (mmol/l) | - | 9 | - |
| Urine proteins (g/l) | 6.0 | 0 | - |
| Blood pressure (mm Hg) | 180/90 | 80/60 | - |

   i. Calculate the creatinine clearance for patient B. (2)

ii. Citing evidence to support your answer in each case, indicate the patient who is most likely to have:
    a. Pre-renal renal failure (2)
    b. Intrarenal renal failure. (2)

iii. Give a physiological explanation for the blood pressure in patient **A.** (2)

iv. Give a physiological explanation for the proteins in the urine (proteinuria) of patient **A.** (2)

3. Describe the regulation of body fluid homeostasis by the renin angiotensin aldosterone system. (15)

4. A 30-year old woman complained of fatigue, an "abnormally high appetite", nervousness, irritability and an abnormal heart beat (palpitations). Upon examination she was seen to have an enlarged thyroid gland (goitre). She was diagnosed with hyperthyroidism due to Grave's disease after the following laboratory results were obtained:

| | **Patient** | **Normal values** |
|---|---|---|
| Resting oxygen consumption (ml/min) | 300 | 250 |
| Serum thyroid stimulating hormone (TSH, mIU/L) | 0.05 | 0.35-5.5 |
| Serum free $T_4$ (pmol/l) | 125 | 11.5-22.7 |
| Plasma thyroid stimulating immunoglobulin (TSI) | + | - |

a) Give a physiological explanation for the patient's high serum free $T_4$ concentration, low serum TSH concentration and goitre. (6)

b) Giving reasons, decide whether the patient is likely to have exophthalmos or an increased cardiac output. (4)

5. Explain the physiological basis of oral contraception. (8)

6. If an eight-year-old boy was castrated:
   a) what would happen to the following levels of gonadotropin- releasing hormone (GnRH), follicle stimulating hormone (FSH), luteinizing hormone (LH), and testosterone in his blood? (2)

   b) What effect would these hormonal changes have on the development of his secondary sexual characteristics and behaviour? (5)

**END OF EXAMINATION**