TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

ECL2303: PHYSIOTHERAPY EQUIPMENT

END OF SEMESTER EXAMINATION

SERIES:APRIL2016

TIME:2HOURS

DATE:9May2016

Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attemptquestion ONE (Compulsory) and any other TWO questions.

Do not write on the question paper.

Question ONE

(a) i) Define the term 'depolarisation' as used in muscle stimulation

ii) Explain the effect of artificial electrical stimulation on nerves and muscles.

iii) Establish probable causes for sudden complete loss or intermittent loss of muscle stimulator signal (8 marks)

(b) i) Name any THREE types of stimulating current used for therapy

ii) Describe the form of direct current used for therapy

iii) Develop a technique for testing the output from a muscle stimulator using your own tactile sensory perception (10 marks)

(c) i) Name the two common types of transducers generally used for ultrasonic therapy.

ii) Describe the mechanism of the effects of ultrasonic energy in biological tissues during therapy

iii) An ultrasonic therapy is reported to have low output and excessive heat generation. Suggest probable cause for this.

iv) With the aid of the general block diagram, explain the operation of an ultrasound therapy machine. (12 marks)

Question TWO

(a) Figure 1 is a block diagram of a shortwave diathermy machine

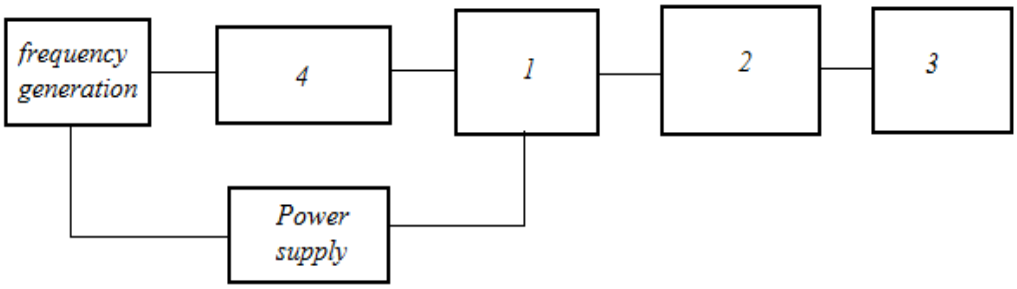

Figure 1

i) Identify the blocks labelled 1 to 4

ii) Explain the purpose of the block labelled 2

iii) Explain the operation of the machine with the aid of the block diagram. (13 marks)

(b) i) Differentiate; in terms of the physiological effect on the human body; externally applied sources of heat and 'diathermy' treatment.

ii) list TWO examples of heat sources for each type of the sources in 2b(i) (7 marks)

Question THREE

(a) i) Define the term 'action spectrum' as applied in ultraviolet therapy

ii) Name any THREE Ultraviolet sources

iii) Explain any TWO negative biological effects in overexposure of ultraviolet radiation to the human body

iv) Describe how therapy is conducted to minimise the negative effects mentioned in 3a(ii)

v) Explain the precaution which need to be taken against the effects in 3a(ii) when servicing an ultraviolet therapy lamps. (10 marks)

(b) i) Explain why meters for phototherapy should be routinely and regularly calibrated.

ii) Suppose an ultraviolet lamp is supplied without intensity control function and you are called upon to include this feature. Explain with the aid of a diagram how you can achieve this with a rectifier-potentiometer.

iii) State any THREE requirements for sources and detectors of ultraviolet radiations for medical applications. (10 marks)

Question FOUR

(a) i) List any TWO parameters that affect depolarisation of a body tissue.

ii) Describe any THREE relations of the parameters in 4a(i) in effecting depolarisation of body tissue .

iii) Explain the advantage of interferential stimulation over Conventional TENS (Transcuteneous Electrical Nerve Stimulator) and neuro-muscular stimulation.

iv) Describe how interferential currents are produced

v) Justify the use of electrotherapy in physiotherapy departments. (14 marks)

(b) i) Explain what is meant by accommodation as applied in electrotherapy

ii) Describe how the threshold current-utilization time (i- t) curve with its characteristic features; rheobase, chronaxie and accommodability ratio is utilised as diagnostic tool in electrodiagnosis. (6 marks)

Question FIVE

(a) i) Name the TWO main groups of infrared generators

ii) Differentiate between the two groups mentioned in 5a(i) in terms of the type of radiation(s) emitted.

iii) For EACH of the generators in 5a(i) describe their construction. (10 marks)

(b) i) State any TWO therapeutic uses of infrared radiation

ii) Explain how infrared treatment is undertaken.

iii) Describe any TWO dangers of infrared radiation therapy mentioning their protective measures. (10 marks)