TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

DEPARTMENT OF MEDICAL ENGINEERING

DIPLOMA IN MEDICAL ENGINEERING (DME 315)

EEP 2250
ELECTRICAL MACHINES AND UTILISATION I

END OF SEMESTER EXAMINATIONS

YEAR 2 SEMESTER 1

SERIES: DECEMBER, 2015

TIME: 2 HOURS

INSTRUCTIONS:

1. You should have the following for this examination:
   - Answer Booklet

2. This paper consists of **FIVE** questions
3. Question **ONE** is **COMPULSORY;** attempt any other **TWO** Questions.
4. Do not write on the question paper.
5. This paper consist of **THREE** printed pages.

Question ONE

(a) Define the term **d.c generator.** **(1 mark)**

(b) State how the direction of rotation of d.c. motor can be reversed. **(1 mark)**

(c) With the aid of a labelled diagram, describe the FOUR main parts of a d.c. motor. **(9 marks)**

(d) A d.c. motor is coupled to a d.c. generator. The motor of efficiency 80% is supplied at 400V d.c. If the generator output is 20kW at an efficiency of 75%, calculate the input current to the motor. **(9 marks)**

(e) Explain the function of the following in d.c. machines:

(i) Armature
(ii) Yoke.

(10 marks)

Question TWO

(a) Define the term **electric motor.** **(1 mark)**
(6 marks)

(b) Describe the following parts of single-phase motor:

(i) Stator
(ii) Rotor.

(4 marks)

(c) With the aid of labelled electric circuit diagram, explain the principle of operation of a single-phase induction motor. **(6 marks)**

(d) The full-load speed of a 6-pole, single-phase induction motor operating from a 50Hz supply is 956r.p.m. Calculate:

(i) the slip speed
(ii) the percent slip
(iii) the rotor frequency.

(9 marks)

Question THREE

(a) State any **TWO** applications of single-phase transformers. **(2 marks)**

(b) Explain why the transformer is described as a machine yet it has no moving parts. **(5 marks)**

(c) Describe the following parts of a single-phase transformer:

(i) Primary winding
(ii) Secondary winding
(iii) Core.

(6 marks)

(d) The **volts-per-turn** of a certain single-phase transformer is 1.7. The transformer has step-down ratio of 3825V to 255V. Calculate:

(i) The number of turns in primary winding
(ii) The number of turns in secondary winding
(iii) The secondary current if the primary current is 12A

(7 marks)

Question FOUR

(a) Distinguish between the following types of motor enclosures:

(i) Flame-proof
(ii) Drip-proof.

(6 marks)

(b) State:

(i) Any **THREE** advantages of electric drive over mechanical drive.
(ii) Any **THREE** methods of transmitting motor torque to the load.

(6 marks)

(c) Explain how the following factors influence the selection of driving motor.

(i) Electrical characteristics
(ii) Mechanical considerations
(iii) Cost.

(12 marks)

Question FIVE

With the aid of a labelled diagram, explain the principle of operation of d.c. generator. **(20 marks)**