TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

EEP 2251: ELECTRICAL MACHINES AND UTILIZATION II

END OF SEMESTER EXAMINATION

SERIES: Select series 2017

TIME: 2HOURS

DATE: 2Sep2017

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) Describe the following distribution systems:
   i). 3-wire
   ii). 4-wire
   iii). 5-wire **(6 marks)**

b) Three identical resistors each of value 52Ω are connected first in star and then in delta across a 415V, 3-phase, 50Hz supply. Calculate:
   i). the line current
   ii). the phase current
   iii). the power taken from the supply in each case. **(14 marks)**

c) If one resistor in (b) is taken out of the circuit in each case, calculate the new values of line and phase currents. **(10 marks)**

Question TWO

a) State:
   i). any **ONE** method used to vary the speed of 3-phase induction motors.
   ii). the effect of interchanging any two phase-lines supplying a 3-phase induction motor. **(2 marks)**

b) Describe the following types of 3-phase induction motors:
   i). wound-rotor motor
   ii). squirrel-cage motor **(4 marks)**

c) A 3-phase induction motor is wound for 4 poles and is supplied from a 50Hz system. Calculate:
   i). the synchronous speed
   ii). the speed of the rotor when the slip is 4% **(6 marks)**

d) Explain the star-delta method of starting 3-phase induction motors. **(8 marks)**

Question THREE

a) Define "synchronous speed". **(1 mark)**

b) State any **TWO** characteristics of a 3-phase synchronous motor. **(2 marks)**

c) A 3-phase, star-connected alternator has a line voltage of 11kV. The output of the a.c. generator is 12MVA at a power-factor of 0.85 lagging. Calculate:
   i). the phase voltage
   ii). the power output
   iii). the line current **(10 marks)**

d) Explain the effect of charging excitation of a 3-phase synchronous motor running with a constant load. **(7 marks)**

Question FOUR

a) Describe the following parts of a 3-phase transformer tank:
   i). oil
   ii). core **(4 marks)**

b) A delta-star, 3-phase power transformer is rated 11kV/415V, respectively. Calculate the:
   i). phase voltage in the primary winding
   ii). phase voltage in the secondary winding **(5 marks)**

c) With the aid of a labelled diagram, explain how a 3-phase, delta-star transformer can feed:
   i). **THREE** single-phase loads
   ii). **TWO** 3-phase loads **(11 marks)**

Question FIVE

a) Describe the terms:
   i). planned preventive maintenance
   ii). breakdown maintenance **(4 marks)**

b) Explain the safety procedures to be observed when performing electrical repairs. **(16 marks)**