TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF MEDICAL ENGINEERING

UNIVERSITY EXAMINATION FOR:

DIPLOMA IN MEDICAL ENGINEERING

EEP 2250: ELECTRICAL MACHINES & UTILIZATION I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: SEPTEMBER 2018

TIME: 2HOURS

DATE: Pick DateSep 2018

Instructions to Candidates

You should have the following for this examination

-Examination pass and student ID

This paper consists of five questions. Attempt any THREE questions.

Do not write on the question paper.

QUESTION ONE

a) Describe the following parts of d.c.motor:-

(i) Yoke
(ii) Armature
(iii) Commutator **(6marks)**

b) (i) State **three** power losses in d.c. motors
(ii) Describe each loss in (i) **(9marks)**

c) A 230V series motor is taking 50A. Resistances of the armature and field windings are 0.2Ω and 0.1Ω respectively. Calculate

(i) the brush voltage
(ii) the back e.m.f.
(iii) the power wasted in armature
(iv) the Mechanical power developed. **(15marks)**

QUESTION TWO

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

b) Distinguish between **brush** and **commutator** **(2marks)**

c) Explain how the generated e.m.f. varies with pole flux **(7marks)**

d) Describe the following in d.c. generators:-

(i) Copper losses
(ii) Iron losses
(iii) Mechanical losses
(iv) Commutation
(v) Armature reaction **(10marks)**

QUESTION THREE

a) Explain why the single-phase induction motor is inherently not self-starting

(5marks)

b) Compare and contrast

(i) Induction motor and synchronous motor

(ii) Capacitor-start motor and capacitor-start-and-run motor **(6marks)**

c) A 4-pole, 250W, 115V, 60Hz capacitor-start induction motor takes a full-load current of 5.3A while running at 1760 r.p.m. If the full-load efficiency of the motor is 64%, calculate

(i) the motor slip

(ii) the power-factor **(9marks)**

QUESTION FOUR

a) Describe the following types of single-phase transformers:-

(i) Core-type

(ii) Shell-type **(4marks)**

b) With the aid of a labelled diagram, explain the principle of operation of the single-phase transformer **(6marks)**

c) A 3300/250V, 50Hz, single-phase transformer has a core of effective cross-sectional area

13,000 mm^2 and a low-voltage winding of 80 turns. Calculate

(i) the number of turns on the high-voltage winding

the maximum flux density in the core **(10marks)**

QUESTION FIVE

a) State any **two** advantages of electric drive over mechanical drive **(2marks)**

b) Describe the following methods of transmitting mechanical power developed by electric motor to the driven machine:-

(i) Direct drive

(ii) Belt drive

(iii) Gear drive

(iv) Chain drive. **(8marks)**

c) Explain how electrical characteristics influence the selection of a driving motor. **(10marks)**