



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING & TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

## UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL AND ELECTRONIC ENGINEERING

EEP 1204: ELECTRICAL POWER EQUIPMENT

SPECIAL/SUPPLEMENTARY EXAMINATION

**SERIES: SEPTEMBER 2018**

**TIME: 2 HOURS**

**DATE: Sep 2018**

### Instructions to Candidates

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of FIVE questions. Answer any THREE questions.

**Do not write on the question paper.**

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### QUESTION ONE

- (a) (i) A resistance of  $20\Omega$  an inductance of  $0.5\text{H}$  and capacitance of  $100\mu$  are connected in series across a  $240\text{V}$ ,  $50\text{Hz}$  supply:-

Calculate: -

- (i) The impedance
- (ii) Current
- (iii) Voltage across R, L and C
- (iv) Power factor Angle
- (v) Active power
- (vi) Apparent power (9 marks)

- (b) (i) A series circuit having  $R=15\Omega$ ,  $L=0.5\text{H}$  and  $C=100\mu\text{F}$  is connected to a constant voltage, variable frequency supply calculate :-

- i. The resonant frequency
- ii. The P.D across the inductor and the capacitor when the supply voltage is  $150\text{V}$
- iii. The impedance when the frequency is  $50\text{Hz}$  (8 marks)

- (c) State two factors responsible for the production of transients in an A.C Circuit. (3marks)

### QUESTION TWO

- (a) (i) Explain :- (i) Slip as applied to an induction motor  
(ii) Why an induction motor does not run at synchronous speed. (7marks)
- (ii) State two reasons why the rotor winding slots of an induction motor are skewed. (7marks)
- (b) i With the aid of a diagram show the production of rotating field in the stator of a three phase machine (8marks)

- ii. Explain the production of torque in the rotor of a three-phase induction motor. (5marks)

### QUESTION THREE

- a (i) State two methods of connecting the windings of a three phase generator and explain how they are carried out (5marks)
- (ii) Describe what is meant by a three phase three wire supply and mention two advantages of such a system over a single phase (5marks)
- b (i) Calculate total power taken from a three phase, 415 V(line) supply by three  $50\ \Omega$  resistor when they are connected (I) in star (II) In delta (6marks)
- (ii) State two methods of power measurements in a three phase supply and explain how they are connected to the supply. (4marks)

### QUESTION FOUR

- (a ) (i) Describe two types of rotor construction in synchronous machine. State the typical application for each. (6marks)
- ii) State three conditions to be fulfilled before a synchronous machine is connected to the supply. (4marks)
- ( b ) (i) Explain :- (i) Two methods of starting synchronous motor (6 marks)
- (ii) Why synchronous machine is not self- starting (4marks)

### QUESTION FIVE

- (a) (i) Explain using a diagram two methods by which transformer windings are wound around the Iron Core (6 marks)
- (ii) Name all the losses which occur in a transformer, and compare value of the losses when the transformer is
- (A) On no load (B) on full load ( 5 marks)
- (b) (i) State the tests carried out on the transformer to determine its efficiency ( 4 marks)
- (ii) Explain the conditions which must be fulfilled so that two three phase transformers may operate in parallel (5marks)