



**TECHNICAL UNIVERSITY OF MOMBASA**

*Faculty of Engineering and Technology*

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

UNIVERSITY EXAMINATION FOR:

CERTIFICATE IN ELECTRICAL POWER ENGINEERING (CEPE 3) PP1

**ELECTRICAL POWER EQUIPMENT**

**EEP 1204**

**END OF SEMESTER EXAMINATION SERIES: MAY 2016**

TIME: HOURS

DATE:

Instructions to Candidates

**You should have the following for this examination**

***Answer booklet, 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) (i) Describe with the aid of a diagram the construction of a d.c machine.  
(ii) Explain the main features and purpose of a D.C face plate starter (9marks)
- (i) Explain what is meant by commutation in a D.C. machine and what steps can be taken to reduce any adverse effects. (7 marks)
- (ii) State methods of improving commutation (4 marks)

### QUESTION TWO

- (a) (i) state two methods by which windings are would around the armature.  
(ii) Derive the emf equation of a generator (8marks)
- (b)(i) Describe commutator windings  
(ii) State three items that constitute the impedance of the generator (8marks)
- (b) Explain the difference between wave winding and lap winding (4marks)

### QUESTION THREE

- (a)(i) With the aid of a diagram explain how a three phase induction motor is started using star-delta method.  
(ii) State the procedure as the induction motorspeeds up (9marks)
- (a) (i) Explain how a squirrel cage induction motor operates  
(ii) State its advantage over the other induction motors (6marks)
- (c) State typical applications for squirrel cage induction motors in the industries (5marks).

### QUESTION FOUR

- a) (i) With the aid of a diagram describe the constructional details of one type of rotor used in large synchronous generators. (5marks)  
(ii) If the generator has four poles, calculate: \_

- I. The generator speed when generating 5Hz
- II. The generated frequency at full load (8marks)

- b) (i) Explain the 'V' characteristics of the synchronous motor s .  
(7 marks)
- c) (ii) State three advantages of a synchronous motor over the normal induction motors (7 marks)

### QUESTION FIVE

- (a)(i) With the aid of a diagram explain the principle of operation of a capacitor start single phase induction motor.
  - (ii) State two applications for the motor in (a) (i) above (7marks)
- b) (i) Draw the typical torque/speed characteristics of the single phase induction motor.
  - (ii) State how the direction of rotation of a single phase induction motor can be changed.  
(8 marks)
- c. Explain briefly why a single phase motor is not self-starting (5marks)