



TECHNICAL UNIVERISTRY OF MOMBASA

Faculty of Engineering & Technology

DEPARTMENT OF MEDICAL ENGINEERING

DIPLOMA IN MEDICAL ENGINEERING

EEP 2250: ELECTRICAL MACHINES & UTILIZATION I

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY 2015

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consists of **FIVE** questions. Attempt question **ONE (Compulsory)** and any other **TWO** questions
Maximum marks for each part of a question are as shown

This paper consists of **TWO** printed pages

Question One (Compulsory)

- a) State the main disadvantages of hydroelectric power station **(1 marks)**
- b) With the aid of a labeled single-line diagram, describe the generation, transmission and distribution stages in the supply of electricity **(7 marks)**
- c) Explain why electricity is usually transmitted at every-high voltages **(5 marks)**
- d) A star connected alternator supplies a delta connected load. The impedance of the load branch is $(8 + j6)\Omega$ per phase. The line voltage is 415V. Calculate:
- (i) The current in the load branch the power consumed by the load
 - (ii) The power factor of the load
 - (iii) The reactive power of the load **(17 marks)**

Question Two

- a) Define the term “synchronous capacitor” **(1 mark)**
- b) State:
- (i) Any TWO applications of each of synchronous motor and universal motor
 - (ii) How the direction of rotation of a universal single-phase motor may be reversed
 - (iii) Any TWO types of electric braking
 - (iv) The disadvantage of electric drive over mechanical drive **(7 marks)**
- c) Explain how the selection of a driving motor could be affected by the following factors:
- (i) Cost
 - (ii) Mechanical considerations
 - (iii) Power rating of motor
 - (iv) Electrical considerations
 - (v) Mains supply available **(12 marks)**

Question Three

- a) Define the term “balanced load” in 3-phase systems **(1 mark)**
- b) Describe the following stages in the supply of electricity **(6 marks)**
- (i) Distribution
 - (ii) Transmission
 - (iii) Generation
- c) With the aid of labeled diagrams, explain the measurement of power in 3-phase circuits using:
- (i) Two-wattmeter method
 - (ii) Three-wattmeter method **(3 marks)**

Question Four

- a) State the method used to reverse the direction of rotation of a d.c. motor **(1 mark)**
- b) Explain how conductor size varies with:

- (i) Current rating
- (ii) Voltage rating

(10 marks)

c) A 220-V d.c. machines has an armature resistance of 0.5Ω . If the full-load armature current is 20A, calculate the induced e.m.f when the machine acts as:

- (i) A generator
- (ii) A motor

(9 marks)

Question Five

a) State any FOUR advantages of electric drive over mechanical drive

(4 marks)

b) Describe the following ways of transmitting mechanical power developed by a motor to the driven machine

- (i) Gear drive
- (ii) Direct drive
- (iii) Chain drive

(6 marks)

c) Explain how the following enclosures ensure protection to motors:

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

(10 marks)