



TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Engineering and Technology

Department of Electrical and Electronic engineering

UNIVERSITY EXAMINATION:

Diploma in Electrical Power Engineering (DEPE 5)

ELECTRICAL MACHINES II

EEP 2301

END OF SEMESTER EXAMINATION

SERIES: MAY 2016

TIME: 2 HOURS

Instructions to Candidates

You should have the following for this examination

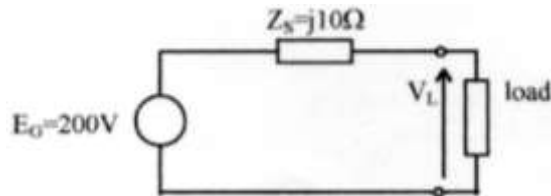
-Answer Booklet, examination pass and student ID

This paper consists of **five** Questions;. Attempt any **THREE** Questions.

Do not write on the question paper.

Question ONE

- (a). (i) Define the per unit system of analysis 2marks
(ii) State Four advantages of the per unit system 4marks
- (b). A generator rated 1000 VA and 200V has internal impedance of $j10 \Omega$. The generator impedance of $j25 \Omega\%$ is stamped on the nameplate together with the other ratings. If the generator is short circuited at its terminals



Determine;

- (i) The short circuit current
(ii) Short circuit power delivered by the generator in p.u., in percentage and in the actual units. 14marks

Question TWO

- (a) State the conditions to be satisfied in order for three phase transformers to be operated in parallel. (4 marks)
- (b) State the FOUR groups in which transformers are classified and state what determines the classification. (8 marks)
- (c) A 400KVA transformer having 0.01 p.u. resistance and 0.05p.u. reactance is connected in parallel with 200KVA transformer 0.012p.u. resistance and 0.04p.u. reactance. Determine how they share a load of 600KVA at 0.8pf lagging. (8 marks)

Question THREE

- (a) Explain the following:
- (i) Hunting in synchronous motor
 - (ii) Causes of hunting
 - (iii) How hunting is countered
 - (iv) Pull out torque
- (10 marks)
- (b) Explain the effect of adding load on a synchronous motor. (5 marks)
- (c) Explain the lamps dark method of synchronizing. (5 marks)

Question FOUR

- (a) State;
- (i) why a synchronous motor is referred to as a synchronous condenser
 - (ii) THREE advantages and THREE disadvantages of synchronous motors over static capacitors when used for power factor correction.
- (10 marks)
- (b) A single phase source is connected to an electrical load. The load draws a 0.6 pu current at 1.10 pu voltage while taking a real power of 0.4 pu at a lagging power factor. Using a base voltage of 8 kV and a base current of 125 A. Calculate the following:
- (a) Real power in kW
 - (b) Reactive power in kVAR
 - (c) Power factor
 - (d) Ohmic values of the resistance and reactance
 - (e) The capacitor kVA rating required to improve the power factor to 0.9 lagging
- (10 marks)

Question FIVE

- (a) State TWO applications of the following:
- (i) Stepper motor
 - (ii) Hysteresis motor
- (4 marks)
- (b) With reference to stepper motors explain:
- (i) Holding torque
 - (ii) Step accuracy
- (4 marks)
- (c) A stepper motor has a step angle of 2.5° and a stepping frequency of 3600 pulses per second. Determine:
- (i) Resolution
 - (ii) Number of steps required for the shaft to make 25 revolutions
 - (iii) Shaft speed
- (12 marks)