



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

SECOND YEAR SECOND SEMESTER EXAMINATION FOR

DIPLOMA IN ELECTRICAL ENGINEERING

EED 214: ELECTRICAL MACHINES 11

DATE: 9/11/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer Question One and any Other Two Questions

QUESTION ONE (30 MARKS)

- a) State any **four** advantage of squirrel cage induction motor (4 marks)
- b) Explain the operation of a three-phase induction motor (6 marks)
- c) List any **four** characteristics of synchronous motor (4 marks)
- d) Explain any **three** effects of changing field excitation of any synchronous motor (3 marks)
- e) Explain the operation of linear motor (7 marks)
- f) A 6 pole ,3 phase induction motor operates from 50 Hz supply. Calculate
 - i. Synchronous speed
 - ii. Rotor speed at a slip of 5 %
 - iii. frequency of rotor current at stand still (6 marks)

QUESTION TWO (20 MARKS)

- a) List the condition maximum torque at
 - i. stand still
 - ii. running condition of a three-phase induction motor (6 marks)

- b) A 415V. Three phase, 51 HZ, 4 poles, star connected induction motor runs at 24 rev/s on full. The motor resistance and reactance per phase is 0.4Ω and 4.5Ω respectively effective motor stator turns ratio is 0.9: Calculate
- Synchronous speed
 - Slip
 - Full speed torque
 - Starting torque
 - Maximum torque
- (14 marks)

QUESTION THREE (20 MARKS)

- a) State any **four** conditions to be observed before synchronous a machine to supply (4 marks)
- b) 11000V, three phase synchronous motor is 50A. The reactance and resistance per phase are 40Ω and 1Ω respectively
Calculate
- Power supplied at 0.8 p.f lagging
 - Induced E.M.F for p.f 0.8 lagging
 - Induced E.M.F for a p.f 0.6 lagging
- (16 marks)

QUESTION FOUR (20 MARKS)

- a) Define the following terms as applied to induction motors
- cogging
 - crawling
- (4 marks)
- b) State any **four** reasons why the motor conductors of squirrel cage motor are skewed
(4 marks)
- c) With the aid a diagram, explain the star –delta method of starting induction motor 12mks

QUESTION FIVE (20 MARKS)

- a) List any **three** characteristics of linear motor (6 marks)
- b) With the aids of a diagram explain the operation of a A.C series motor (14 marks)