COLLEGE OF ENGINEERING & TECHNOLOGY
Department: Electrical & Computer Control Engineering
Lecturer: Staff
Course: Electrical Machines
Course Code: EE 329 T — Marks: 40
Date: 14/01/2016 — Time: 2 hours

Final Exam

Answer All questions.

1) (A) Explain two methods for controlling the speed of:
   (i) D.C. shunt motor.
   (ii) D.C. series motor.

(B) A D.C. series motor when loaded to 50 A runs at 1500 r.p.m. on a 220 V supply. The motor resistance is 0.1 Ohm. Calculate the value of the resistance to be inserted in series to decrease the speed to 900 r.p.m. at which the load torque is half the previous value.

(10 Marks)

2) (A) Explain the construction of different types of synchronous generators and their uses.
(B) A three phase 460 V, two pole, 60 HZ star connected synchronous alternator with a synchronous reactance of 1.26 Ohm/phase is connected to an infinite bus. The power angle when supplying 112 KW to the bus is 25°, neglecting losses. Determine:
(i) Turbine torque supplied to alternator.
(ii) E.M.F. generated in the armature.
(iii) Active and reactive components of apparent power and P.F.
(iv) Turbine speed.

(10 Marks)

3) (A) State the precautions for short-circuit test of a transformer, and explain why such a test is suitable for obtaining the copper losses.
(B) In a single phase, step-up transformer whose nominal ratio is 110 V/550 V, the following experimental test data was obtained from the primary side:

	Voltage	Current	Power
Open circuit test	110 V	0.5 A	19 W
Short circuit test	10 V	20 A	100 W

If the transformer is connected to a load of (180 + j 200) Ohm at the nominal voltage, Determine:
(i) The primary voltage and current.
(ii) The transformer efficiency.
(iii) The voltage regulation.

(10 Marks)

4) (A) Explain the torque-slip curve of a three phase induction motor.
(B) A 10 pole, 125 hp, 575 V (line value), star connected, 60 HZ, three phase induction motor operated at rating conditions draws a line current of 125 A and has an overall efficiency of 93%. The core loss, stator copper loss, and rotor copper loss are 1053 W, 2527 W, and 1755 W respectively. Sketch the power flow diagram and determine:
(i) Shaft speed. (ii) Developed torque. (iii) Shaft torque.
(iv) Power factor. (v) Combined windage, friction losses.

(10 Marks)

Good luck

Members of Course Examination Committee:	Signature:	Date:
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