

COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electrical & Control Engineering

Lecturers : Staff

Course : Electrical Machines

Starting Time: 11:30

Course Code: EE 329

Marks: 40

Date : 22 / 01 / 2015

Time: 2 hours



Final Examination Paper

Answer the following questions:

1.a. Explain the methods for controlling the speed of a dc shunt motor.

1.b A 220 volts dc shunt motor has an armature circuit resistance of 0.1Ω and a shunt field circuit total resistance of 110Ω . The full load current was 42 amperes at a speed of 1000 r.p.m. Assume that the magnetic flux is constant over the given operating range.

Find the value of the resistance to be inserted in series with the armature so that speed drops to 80 % from its full load value if the total torque was **decreased to** 60 % of the full load value.

(10 Marks)

2.a. Discuss the conditions and steps needed to connect two synchronous alternators in parallel.

2.b. A 60 kVA, 380 V, 50 Hz alternator has an effective armature resistance of 0.16Ω and an armature leakage reactance of 0.7Ω .

- Calculate the value of the **Electro-Motive Force** induced in the armature "E" when the alternator is delivering full load current at 0.75 lagging power factor.

- Find the value of the active power "P".

(10 Marks)

Members of course Examination Committee:	Signature of Members of course Examination Committee:	Date:
Lecturer: Staff		5/1/2015
Course Coordinator : Dr. Ahmed Kadry		5/1/2015
Head of Department: Prof. Hamdy Ashour		3/1/2015

3.a. Explain the theory of operation of three phase induction motors.

3.b. A three phase, 380 V, 50 Hz, 125 Hp, six pole induction motor draws a full load line current of 215 A at 0.75 power factor. The core losses, stator copper loss and rotor copper loss are 1800 W, 3000 W and 1550 W respectively. Determine the following:

- (i) Air gap power. (ii) Shaft speed
(iii) Rotational losses (iv) Efficiency

(10 Marks)

4.a. Discuss briefly the different kinds of tests needed to identify the transformer losses and parameters.

4.b. A single phase transformer rated 75 kVA, 4800 / 240 V, 50 Hz, has the following parameters:

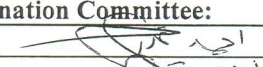

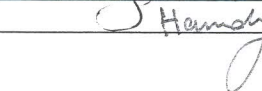
	Resistance "R"	Leakage reactance "X"
Primary winding	2.48 Ω	4.83 Ω
Secondary winding	0.006 Ω	0.0121 Ω

The transformer is operated at **full** load at 0.96 lagging power factor, Determine the following if the no-load current of the transformer is negligible:

- The equivalent impedance of the transformer referred to the primary side.
- The actual input voltage at full load.
- The full load copper losses.

(10 Marks)

Good Luck

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