



COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electrical & Control Engineering

Lecturers: Staff

Course : Electrical Machines

Starting Time: 14:00

Course Code: EE 329

Marks: 40

Date : 16 / 01 / 2016

Time: 2 hours

Final Examination Paper

Answer any Four questions:

1.a. Draw the Power Flow Diagram of a DC generator and explain the different types of losses

1.b A 4-pole dc shunt generator has an armature resistance of 0.018Ω . The armature is lap-wound with 520 conductors. When driven at 750 rev/min the machine produces a total armature current of 400 A at a terminal voltage of 200 V. Calculate the useful flux/pole.

(10 Marks)

2.a. Discuss the necessity for using a starting method with DC motors.

2.b. A 220 V series-connected DC motor has armature and field winding resistances of 0.5Ω and 1.5Ω respectively. The current drawn by the motor is 20 A when the motor drives a load at 1200 rpm. If the rotational loss is 150 W, find the output power and efficiency.

(10 Marks)

3.a. A 440V / 220V step-down transformer has the following parameters:

Primary resistance	Primary reactance	Core loss resistance	Magnetizing reactance	Secondary resistance	Secondary reactance
R_1	X_1	R_C	X_m	R_2	X_2
0.16Ω	0.32Ω	270Ω	100Ω	0.04Ω	0.08Ω

The transformer delivers 20 kW at 0.8 power factor lagging. Find the primary current and voltage using the exact equivalent circuit.

Members of course Examination Committee:	Signature of Members of course Examination Committee:	Date:
Lecturer: Prof. Ahmed Lotfy		5/1/2016
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Head of Department: Prof. Hamdy Ashour		5/1/2016

3.b. would you have a secondary voltage if the primary of a transformer was fed from a dc supply? Give reason for your answer.

(10 Marks)

4.a. Draw the exact equivalent circuit of an induction motor.

4. b. A 3 phase 380V, 50Hz induction motor with 6 poles has a shaft (output) power of 19 hp at 950 rpm. The total stator losses and the mechanical losses are 1500 W and 746 W respectively.

Find the following:

- (i) The % slip.
- (ii) The rotor copper losses
- (iii) The efficiency

(10 Marks)

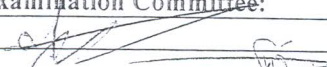


5.a. State the conditions for paralleling two synchronous alternators.

5.b. A 40 KVA, 240 V, 50 Hz, 4 pole, three phase, Y-connected, synchronous alternator has armature winding resistance and synchronous reactance of 0.08 and 0.8 Ω /phase respectively. When the generator delivers the rated load at a leading power factor of 0.866, determine the following:

- (i) The induced electro-motive force per phase " E_a "
- (ii) The voltage regulation.
- (iii) The synchronous speed " n_s "
- (iv) Sketch a phasor diagram

(10 Marks)

Good Luck

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