COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturers : Prof. M. Abouzeid

Course : Electrical Machines III

Course Code: EE 422

Date : 17 / 1 / 2015 Time : 2 hours

Answer The Following Questions:

Question One: A15 - B2

a) Derive an equation for the three phase currents from the three phase side given the two currents of the two phase side. (3 marks)

b) 11000/440 V, Star/Delta, 50 Hz, three phase transformer delivers a load of 15 KVA at unity power factor with the following per phase impedance values: Primary side : 2 + j 1.5 ohm & Secondary side : 0.05 + j 0.0375 ohm, find:

i) Line input current & voltage. (3 marks)

ii) Input power and total efficiency. (4 marks)

Question Two: A15 - B2

a) Sketch a drawing for one phase only of synchronous generator windings that has Number of poles = 4 & slot/pole/phase = 3. (3 marks)

b) Three phase, 50 Hz, 4 poles synchronous generator has Z_S = (1+j5) ohm, given delta angle = 15^O and power factor = 0.7 lag, find :

i) Output power, current and E_{PH}. (3 marks)

ii) For same E_{PH} find Max. output power & its current & PF. (4 marks)

Question Three: A15 - B2

a) Mention the necessary conditions for synchronizing two generators in parallel and show how three lamps be used in this case. (3 marks)

b) Three phase, 750 W, 200 V, 50 Hz, 4 poles synchronous generator has phase armature resistance of 2 ohm working at 0.8 lag PF. If the following test data are given:

Field Current	0	0.1	0.2	0.3	0.4	0.5	0.6
Open circuit Voltage	0	30	60	87	107	127	137
Short Circuit Current	0	0.5	1	1.5	2	2.5	3

i) Find synchronous Impedance & Reactance at full load. (4 marks)

ii) Voltage Regulation at full load. (3 marks)

Question Four: A15 - B2

a) Derive an expression for the output power for the salient pole synchronous generator as function of E_{PH} , V_{PH} , X_D, X_Q and load angle delta. (3 marks)

b) Three phase salient pole synchronous generator, 380 V, 50 Hz, 4 poles with direct and quadrature synchronous impedances of 20 & 15 ohms respectively, delivers a phase current 15 Amperes at 0.7 lag power factor, find :

i) E_{PH} and load angle delta. (4 marks)

i) Output load power. (3 marks)

Members of course Examination Committee:	Signature:	Date:
Lecturer : Prof. Mahmoud Abouzeid		31-12-2014
Course Coordinator : Dr. Ahmed Kadry	Hamdy	31/12/2014
Head of Department : Prof. Hamdy Ashour	Hamdy	31/12/2014

With Our Best Wishes