



COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electrical & Control Engineering

Lecturers : Ahmed Lotfy

Course : Electrical Machines III

Starting Time: 09:00

Course Code: EE 422

Marks: 40

Date : 12 / 01 / 2016

Time: 2 hours

Final Examamination Paper

Answer the following questions:

1. (a) Use schematic drawing and phasor diagrams to illustrate the theory of operation of a **three-phase** phase-shifting transformer.
[A8] (8 Marks)

1. (b) Three **single phase** 80 kVA, 5000V/250V step-down transformers are combined to form a **star-star** bank. The bank is used to supply a 216 kW, 433 V, 0.9 lagging power factor 3 phase load. The equivalent resistance and reactance per phase as seen from the primary side are 4.888Ω and 9.724Ω respectively. Find the actual primary voltage and current, and the voltage regulation.
[B2] (6 Marks)

2. (a) Draw on the same graph the relation between the voltage of a synchronous alternator and the load current when the load is:
(i) Resistance (ii) Inductive ($R+j\omega L$) (iii) Capacitance
Sketch the phasor diagrams and use it to give reason for the voltage regulation in each case.
[A8] (6 Marks)

(b) A 20 kVA, 480 V, 50 Hz YY alternator has an armature resistance and a synchronous reactance of 0.2Ω and 1.02Ω per phase respectively. Find the following when the alternator is delivering full load current at 0.8 lagging power factor.
- The induced EMF "E".
- The power (torque) angle " δ ".
- The voltage regulation
[B2] (6 Marks)

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

