



COLLEGE OF ENGINEERING & TECHNOLOGY

Department: Electrical & Control Engineering

Lecturer : Prof Yasser Gaber, Dr Moustafa Saad, Dr Nahla Zakzouk

Course : Electrical Power and Machines

Course Code: EE 328

Date : 13 / 1 / 2016

Marks: 40

Time : 2 hours

ANSWER THE FOLLOWING QUESTION:

- Q1: (a) State the effect of low power factor loads on a power system and how can this power factor be improved. (3 marks)
- (b) The loading of a factory on a 1000-V, 60-Hz system includes:
20 KW heating (unity power factor)
10KW induction motors (0.7 lagging power factor)
5 KW lighting (0.85 lagging power factor)
- Establish the power triangle for the total loading on the supply.
 - Determine the power factor capacitor required to raise the power factor to unity.
 - Determine the change in supply current from the uncompensated system to the compensated one. (7 marks)

ANSWER THREE QUESTIONS ONLY FROM THE FOLLOWING:

- Q2: (a) Explain the construction of the synchronous generator. (3 marks)
- (b) In a 10 kVA, 440 V, 50 Hz, synchronous generator the armature resistance and synchronous reactance are 0.25Ω , 3.7Ω respectively. At rated load and 0.8 power factor lagging, determine the induced voltage, voltage regulation and maximum developed power. (7 marks)
- Q3: (a) Discuss the short circuit test of a single-phase transformer. (3-marks)
- (b) A 250/500 V single-phase transformer has the following parameters:
Primary resistance, $R_1 = 0.05\Omega$, Primary reactance, $X_1 = 0.1\Omega$,
Secondary resistance, $R_2 = 0.3\Omega$, Secondary reactance $X_2 = 0.6\Omega$
Magnetization (No-load) resistance and reactance: $R_0=500\Omega$, $X_0 = 100\Omega$
Determine the input voltage, current and transformer efficiency when the output current is 10 A at 500 V and 0.8 power factor lagging. (7-marks)
- Q4: (a) Explain the theory of operation of the three phase induction motor. (3 marks)
- (b) A 20hp, 3-phase, 500 V, 50 Hz, induction motor with 6 poles runs at 950 rpm with power factor of 0.86 lagging. The rotational losses are 1 hp. If the total stator losses are 1500 W, find the slip, the efficiency and the input current. (7 marks)
- Q5: (a) Mention applications of different DC motors' types. (3 marks)
- (b) DC series motor has the following data: Armature resistance = 1.5Ω , Series resistance = 2.5Ω , Supply voltage = 300 volt, Mechanical & core losses = 300 W. If the input power is 6 KW at 3000 RPM, find: Developed power, output torque and motor efficiency. (7 marks)

Name	Signature	Date
Lecturer: Staff		5/1/2016
Course coordinator: Dr Ahmed Kadry		5/1/2016
Program Chair : Prof. Hamdy Ashour		5/1/2016