



COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Dr. Rania Assem

Course : Electrical Power Distribution

Course Code : EE 543

Marks : 40

Date : 11 / 01 / 2016

Time : 2 hours

Answer ALL The Following Questions:

Q1 [10 marks] (A, 26)

- a- Compare between the different primary distribution systems arrangements indicating merits, demerits and practical application of each approach (4 marks)
- b- It is required to perform load calculation for a sports center that includes the following loads shown in table 1. Assuming 380 V, 0.85 lagging power factor for inductive loads, determine the maximum demand for the sports center using the Egyptian Code of practice found in table 2. (6 marks)

Load Type	Description	Power rating and Description
Illumination	Total illumination	15000 W
General purpose receptacles	Sockets	2A each, 30 circuits each containing 6 sockets
Electrical Equipment:	Garage door	1.2 hp motor
	Trade mill	1400Watt
	2 air conditioning units	3.5 hp / unit
	3 air conditioning units	2.5 hp / unit
	2 air conditioning units	2 hp / unit
Cooking equipment:	Electric cooker	6000 Watt
	2 small electrical cookers	2000 Watt / unit
	Electric heater	1200Watt
Electric Pumps:	1 water pump	1.6 kWatt
	1 water irrigation	2.8 kWatt
	1 water sewage pump	0.6 kWatt
Water Heaters:	2 heaters continuously working	3 kWatt /unit
	1 heater continuously working	2 kWatt
	1 heater for kitchen	6 kWatt
	2 Jackoozy	5 kWatt

Q2 [10 marks] (A.4, B.3)

- a- Mention if the following statements are TRUE or FALSE, and correct the FALSE statement: (5 marks)
- i- Nominal voltage is the voltage found on the nameplate of an equipment ()
 - ii- Residual current circuit breaker rated 30 mA are used in domestic equipment ()
 - iii- PVC cables are designed to tolerate higher temperatures than XLPE cables ()

Members of course Examination Committee:	Signature:	Date:
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- iv- Type D circuit breakers are suitable for sensitive electronic equipment ()
- v- Ring main supply riser is more suitable in high buildings than double fed supply riser ()

b- For the problem in question 1 and using tables 3 to 5, it is required to supply the sports center and a residential load with one main feeder who is 0.5 km long away from a 11,000 /380 V distribution transformer. (5 marks)

- i. Determine the diversified maximum demand to determine the feeder size knowing that it will supply the sports center and a residential load of 80 kWatt with a diversity factor of 1.2.
- ii. Select the appropriate cross sectional area of the XLPE insulated copper feeder using taking into account that the cable is buried in ground at ground temperature 45° at a burial depth of 80 cm. Power factor is regulated at 0.9 lag
- iii. Is the selected cable appropriate for 4% voltage drop criteria? If not, mention how will you modify your design to select a more appropriate cable using chart in figure 1.

Q3 [10 marks] (A,26)

a- Compare between the power transformer and distribution transformer, your answer must include the uses, full load operation, efficiency, tap changer and protection (4 marks)

b- For the 11,000 /380 V distribution transformer in question 1: (6 marks)

- i. Select appropriate size of the transformer according to the Egyptian code of practice
- ii. Suggest the type of primary and secondary winding transformer connection. Give reason for your choice
- iii. Suggest the type of cooling and mention the cooling class for the transformer as per IEC standard.




Q4 [10 marks] (A,4)

a- Mention some of the problems associated with individual power factor correction. (3 marks)

b- How can you distinguish between incoming and outgoing cells inside the RMU distributor? (3 marks)

c- A 4.16 kV/440 V, 3 phase, 300 kVA, delta/wye transformer is used to supply a load at 0.65 power factor. The transformer is overloaded by 10 %. Analyze this condition and suggest a suitable mitigation approach through power factor correction. (4 marks)

With all My Best Wishes

Members of course Examination Committee:	Signature:	Date:
Lecturer : Dr. Rania Assem		5/11/2016
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