COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electrical & Control Engineering

Lecturer : Dr. Rania Assem

Course : Electrical Power Distribution

Course Code : EE 543 **Marks : 40**

Date : 30 / 05 / 2016 **Time : 2 hours**

Answer ALL The Following Questions:

Q1 [10 marks] (A, 26)

a-Comment on the following statements: **(5 marks)**

i- Open loop primary distribution configuration is more reliable than radial type configuration

ii- Double fed supply riser are used in high and tall buildings rather than single main riser

iii- Systems with high diversity factors are more economical

b- It is required to perform load calculation for a 200 m^2 apartment (private residential unit) that has the loads shown in table (1). Determine the maximum demand for the apartment using the Egyptian Code of practice found in table 2. Assume that the apartment is fed from a single phase, 220 V outlets. **(5 marks)**

Table 1: Residential Apartment Description and Rating

Load Type	Description	Power rating
Illumination and general purpose receptacles	Total illumination	30 VA/m^2, unity power factor
Fixed cooking equipment:	Electric cooker	1.5 kWatt, , unity power factor
Fixed appliances:	Washing machine	2.5 kWatt, 0.86 lagging power factor
	Dishwasher	2.5 kWatt, 0.86 lagging power factor
	Oil deep fryer	2.0 kWatt, unity power factor
	2 Air conditioning units	2.5 kVA /unit, 0.9 lagging power factor
Water heater	Non continuously operated, 2 units	1.5 kWatt/unit

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

a- Figure 1 shows the name plate of a molded case circuit breaker. State what is meant by the following labels marked on the breaker nameplate: **(5 marks)**

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i. Ui

ii. Ue

iii. Icu

iv. Ics

v. Uimp

b- It is required to feed a commercial and residential building of 160 kWatt maximum demand with a main primary feeder who is 0.5 km long away from a 11,000 /380 V distribution transformer. Taking diversity factor of 1.2 and using tables 3 to 5 perform the following: **(5 marks)**

i. Select the appropriate cross sectional area of the PVC 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

ii. 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 2.

Schneider Electric

Compact

NSX250 H

Ui 800 V		Uimp 8 kV	
Ue (V)		Icu (kA)	Ics
220/240	∿	100	100
380/415	∿	70	70
440	∿	65	65
500	∿	50	50
525	∿	35	35
660/690	∿	10	10

50/60Hz cat A

IEC / EN 60947-2

NEMA AB1	HIC (kA)
240V	100
480V	65
600V	35

Figure 1: Question 2

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 2: **(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 the methods for power factor compensation, your answer must include explanation, advantages and disadvantages of each technique **(4 marks)**

b- How can you distinguish between incoming and outgoing cells inside the RMU distributor? **(2 marks)**

c-Utility company will supply a 200 kVA ABB oil distribution transformer of problem 3 whose load factor equal to 0.5, calculate the capacitor control setting at low voltage panel so as to improve the power factor of the 80 % motor power factor up to 90 % (lag) using table 3. **(4 marks)**

With all My Best Wishes

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