UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER I
SESSION 2016/2017

COURSE NAME	:	POWER SYSTEM
COURSE CODE	:	DAE 32403
PROGRAMME	:	3 DAE
EXAMINATION DATE	:	DECEMBER 2016/JANUARY 2017
DURATION	:	2 HOURS 30 MINUTES
INSTRUCTIONS	:	ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF **SEVEN (7)** PAGES

Q1 (a) Illustrate with the aid of appropriate diagram the system connection and the operational aspect of the following distribution system.

(i) radial system
(ii) ring main system

(15 marks)

(b) Describe **three (3)** advantages of using single line diagram in solving problems related to power system network.

(3 marks)

(c) The electrical power system in Malaysia is a complex interconnected system. Describe the advantages and the disadvantages of interconnection of the electrical power network.

(7 marks)

Q2 (a) Define and describe thoroughly the quantity known as power factor.

(10 marks)

(b) Two loads $Z_1 = 100 + j0\Omega$ and $Z_2 = 10 + j20\Omega$ are connected across a 240-Vrms, 50Hz source, find:

(i) the total real power
(ii) the reactive power
(iii) the power factor at the source
(iv) the total current
(v) the capacitance of a new capacitor to be connected across the loads to improve the overall power factor to 0.8 lagging.

(15 marks)

Q3 (a) Majority of the analysis of a network system which includes generators, transmission and distribution lines uses per unit applications. Give **three (3)** characteristics of the per unit technique in analyzing network system.

(5 marks)

(b) A distribution system with its rated values is shown as in the **Figure Q3 (b).**

(i) Determine the per unit reactance for the system
(ii) Solve for the total reactance of the system as of at point **F** on the figure

Take the base kVA and the base kV for the system as 100 MVA and 33 kV respectively at the generator G1 and G2.

(20 marks)

Q4 (a) In supplying power to the consumers, the power supply authorities have certain social obligation and basic responsibilities to fulfill. Describe the **five (5)** basic requirements of electric power flow.

(5 marks)

(b) Transmission lines are made up of conductors, insulators and supporting structures. List in details the following aspect:

(i) **three (3)** characteristic of conductors
(ii) **five (5)** characteristic of insulators

(8 marks)

(c) A single circuit three phase line operated at 50 Hz is arranged as shown in **Figure Q4(c)**. The conductors are ACSR Drake. Determine the inductive reactance per mile per phase. Given data from table, as $D_s = 0.0373\ ft$

(12 marks)

Q5 (a) It has been a challenge for utility company to provide reliable electricity supply demand for their customer. This is because, electric power fault always occurs at the transmission lines. State the **two (2)** categories of faults and its types that appeared at the trasmission line.

(4 marks)

(b) Describe **four (4)** reasons of doing fault analysis in power system application.

(6 marks)

(c) A generating system has two generators connected in parallel to supply power to various loads, as shown in **Figure Q5(c)**. Using a 120MVA base, determine the following requirement by considering a three phase fault occurrence at point F.

(i) the fault current in amperes
(ii) the fault MVA in pu

(15 marks)

Q6 (a) Protection schemes must have high sensitivity in its operation when a fault occurs under minimum fault conditions. What are the **three (3)** consequences of a fault to the electrical power system.

(6 marks)

(b) Circuit breaker is known as a switch that is obviously applied to any circuit that received fault signal from a relay and causes the network to be open circuited due to fault in section of the circuit. Briefly explain the **six (6)** characteristics of a circuit breaker to fulfill the job.

(6 marks)

(c) Explain fully **five (5)** basic design requirements for a proper protection arrangement of electrical power systems.

(13 marks)

END OF QUESTIONS

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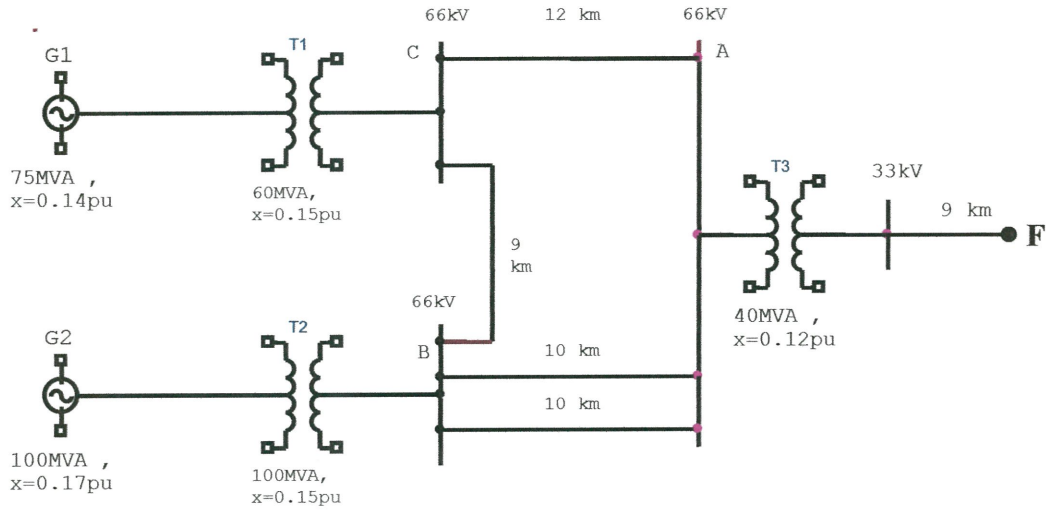

FIGURE Q3(b)

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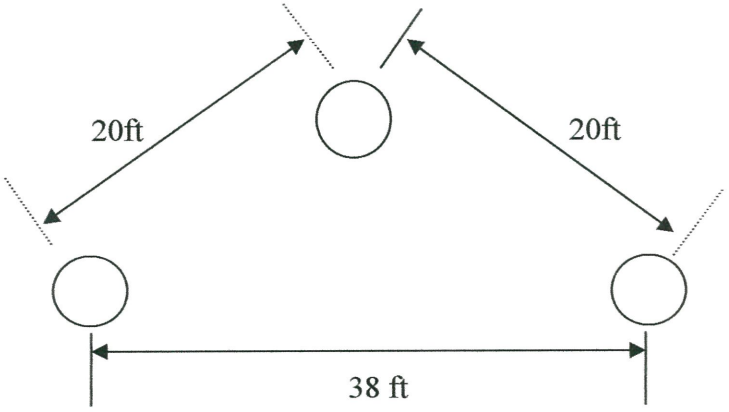

FIGURE Q4(c)

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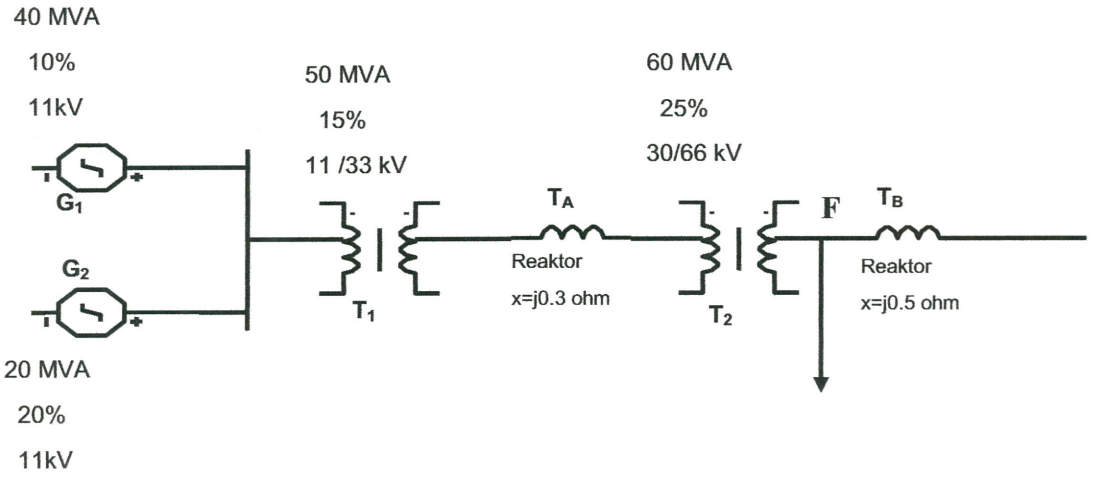

FIGURE Q5(c)