UTHM
Universiti Tun Hussein Onn Malaysia

# UNIVERSITI TUN HUSSEIN ONN MALAYSIA

## FINAL EXAMINATION
## SEMESTER I
## SESSION 2017/2018

| | | |
|---|---|---|
| COURSE NAME | : | POWER SYSTEM |
| COURSE CODE | : | DAE 32403 |
| PROGRAMME | : | DAE |
| EXAMINATION DATE | : | DECEMBER 2017/JANUARY 2018 |
| DURATION | : | 3 HOURS |
| INSTRUCTIONS | : | ANSWER **FIVE (5)** QUESTIONS ONLY |

THIS QUESTION PAPER CONSISTS OF **NINE (9)** PAGES

**Q1** (a) Illustrate with the aid of appropriate block diagram the operation of nuclear and hydro plants to generate electricity.

(10 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 **four (4)** advantages and **four (4)** disadvantages of interconnection of the electrical power network.

(7 marks)

**Q2** (a) Tabulate the summary of the relation of the phase and the line voltages/current star connected supply to a star connected load.

(5 marks)

(b) A three phase 415V, 50 Hz star connected source is being connected to a star connected load with impedances as shown in **Figure Q2(b)**.

(i) Determine the active power, reactive power and the power factor of each of the loads.

(ii) Obtain the system's active and reactive powers and its overall power factor



(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)

(c) A generating system has two 6.6 kV generators connected in parallel to a busbar via a respective transformer, as shown in **Figure Q5(c)**. Using a 10MVA, 6.6 kV base, determine the following requirement by considering a three phase fault occurrence at the end of the feeder connected from the busbar.

(i) The fault current in amperes
(ii) The fault MVA in p.u.

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

(10 marks)

(c) 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.

(4 marks)

**Q7** (a) In each distribution station there will be a system that control the power flows from the transmission lines to the consumer. It also steps down medium voltages to a lower voltage level using a transformer. A transformer is one of the equipment that is located inside the substation. List down the **five (5)** other major equipments that are located inside the substation.

(10 marks)

(b) Circuit breakers are used to interrupt short circuit currents. The following are the types of circuit breakers : -

(i) Air blast circuit breaker.
(ii) Oil circuit breaker
(iii) Vacuum circuit breaker
(iv) $SF_6$ circuit breaker

Give detail explanations of each of the above circuit breaker.

(10 marks)



**END OF QUESTIONS**

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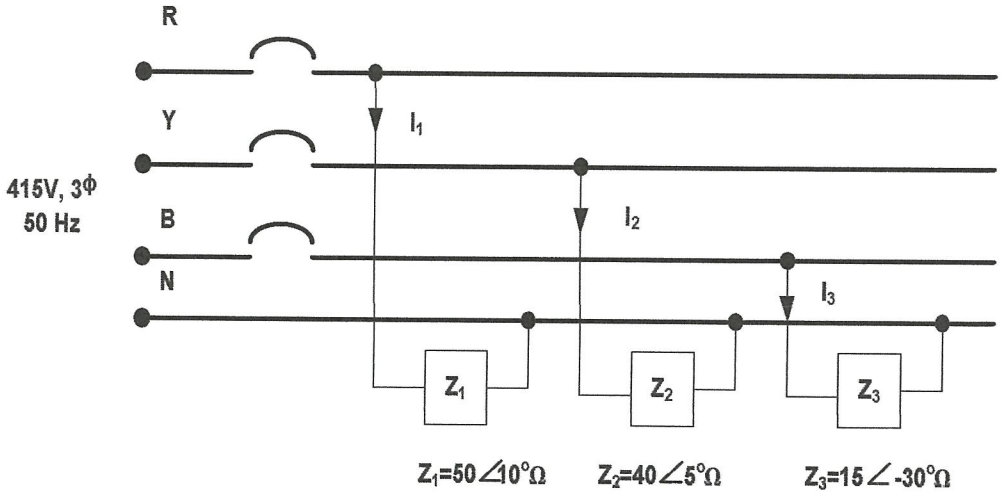




FIGURE Q2(b)

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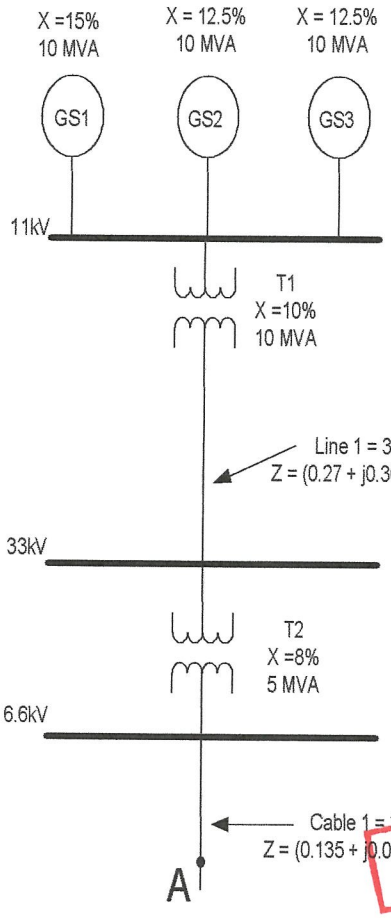




**FIGURE Q3(b)**

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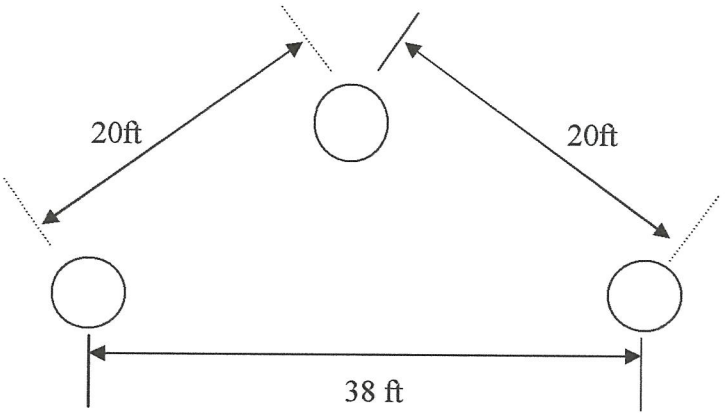


**FIGURE Q4(c)**

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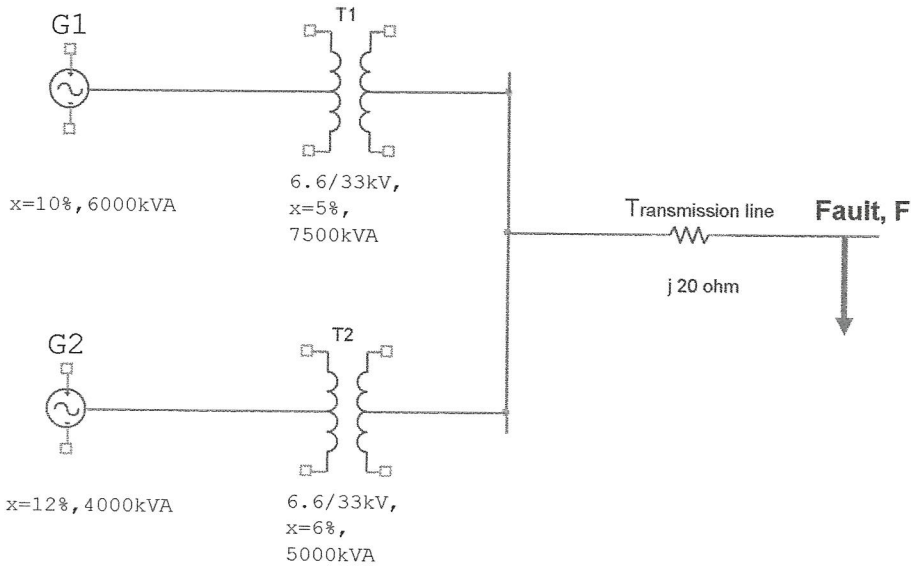


**FIGURE Q5(c)**