

UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER II
SESSION 2012/2013**

COURSE NAME : ELECTRICAL POWER SYSTEM
COURSE CODE : DAE 32403 / DEK 3213
PROGRAMME : 3 DAE/DAL
EXAMINATION DATE : MARCH 2013
DURATION : 2 1/2 HOURS
INSTRUCTIONS : ANSWER **FOUR (4)**
QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF EIGHT (8) PAGES

- Q1**
- (a) The electrical power supply throughout Malaysia is linked through the national grid. State **three (3)** advantages of this system.
(2 marks)
- (b) The electrical power system in Malaysia is a complex interconnected system. State the main reasons for the interconnection of the electrical power network.
(9 marks)
- (c) List the **two (2)** types of transmission system. Describe briefly both the transmission system mentioned.
(6 marks)
- (d) Describe the characteristics that will influence the power generation and the power transmission system of a country.
(8 marks)
- Q2**
- (a) Fundamental analyses of power system are always base upon the relationships of voltages, current and power of a three phase circuit. Describe **three (3)** main reasons why the three phase system are important.
(8 marks)
- (b) An interconnected system with its rated value is shown as in the Figure Q2(b). Obtain the per-unit reactance, the base kVA and the base kV for the system is chosen to be 10 MVA and 20 kV respectively at generator GS1. Find the total reactance of the system as of at point F on the figure.
(17 marks)

- Q3** (a) Most of the analysis of three phase network which includes generators, transmission and distribution lines uses per unit applications. This simplifies most of the calculations. Give **five (5)** advantages using this per unit technique in analyzing network system.

(5 marks)

- (b) Figure Q3 (b) shows the reactance and the rated value which is based on the individual voltage value. Draw the equivalent impedance diagram by using a base of 10 kVA at G_1 .

(20 marks)

- Q4** (a) Transmission lines are made up of conductors, insulators and supporting structures. Explain the characteristic of conductors and insulators in details.

(9 marks)

- (b) One circuit of a single phase transmission line is composed of three solid 0.5 cm radius wires which form the x conductor. The return y conductor composed of two solid 1.5 cm radius wires. The arrangement of conductors is shown in Figure 4(b) below. Applying the concept of the GMD and GMR, find the inductance of the complete line in millihenry per kilometer.

(16 marks)

- Q5** (a) Give four (4) reasons of doing fault analysis in power system application.

(5 marks)

- (b) Consider the circuit on Figure Q5(b), by taking a base of 100 MVA and by using network reduction, find the fault current and fault MVA level at point F on the network.

(16 marks)

- Q6 (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 **five (5)** other equipments that are located inside the substation.

(12 marks)

- (b) Circuit breakers are used to interrupt short circuit currents. Following are the types of circuit breakers : -
- (i) Air blast circuit breakers.
 - (ii) Oil circuit breakers.
 - (iii) Vacuum circuit breakers
 - (iv) SF₆ circuit breakers

Give detail explanations of each of the above circuit breaker.

(13 marks)

- END OF QUESTION -

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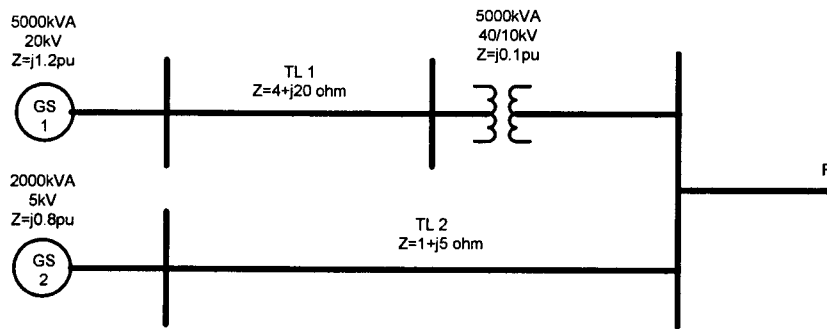


FIGURE Q2(b)

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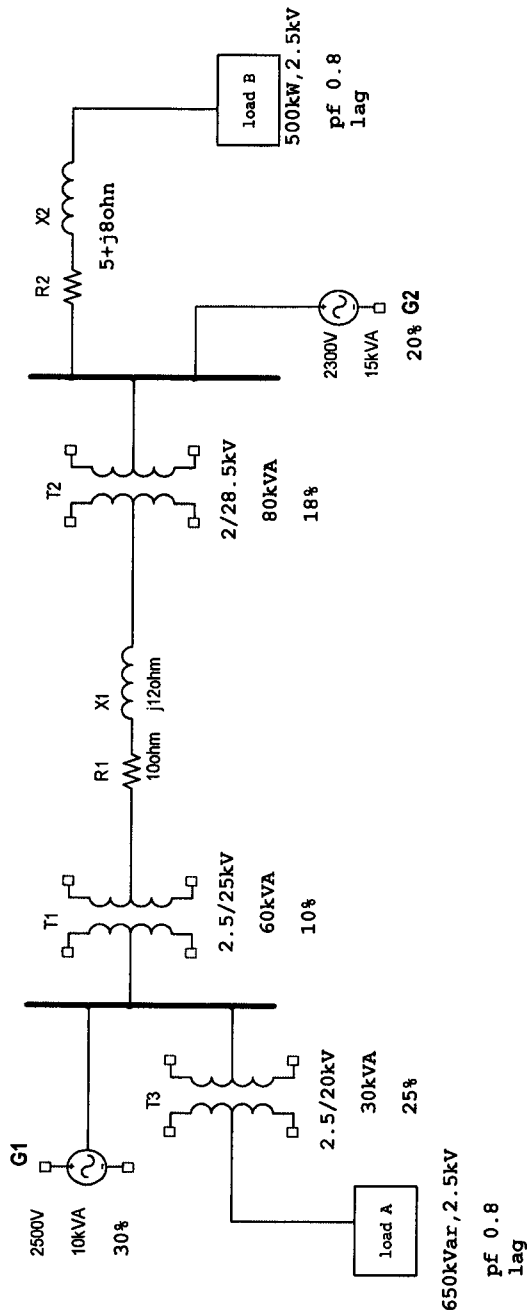


FIGURE Q3(b)

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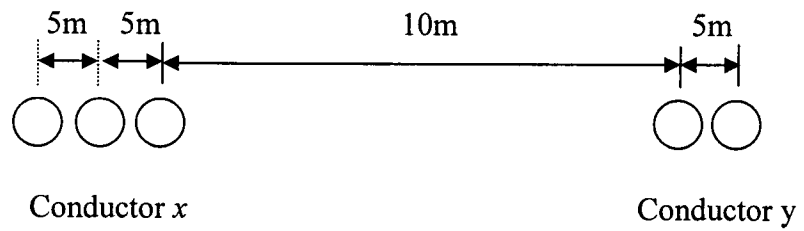


FIGURE Q4(b)

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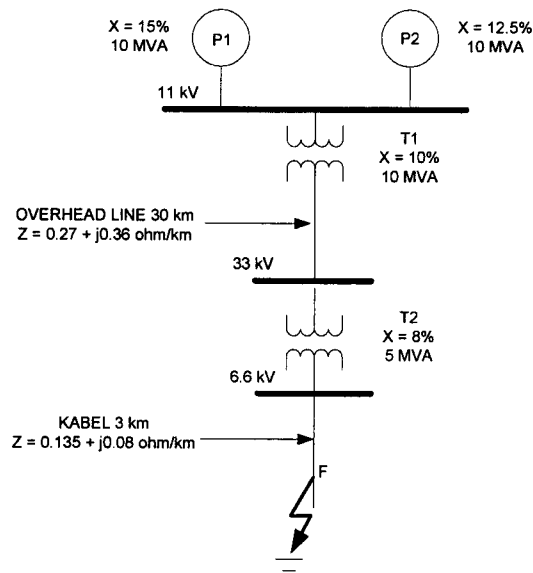


FIGURE Q5(b)