UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2011/2012

COURSE NAME	:	ELECTRIC POWER SYSTEM
COURSE CODE	:	DEK 3213 / DAE 32403
PROGRAMME	:	3 DEE / 3 DAE
EXAMINATION DATE	:	MARCH 2012
DURATION	:	3 HOURS
INSTRUCTIONS	:	ANSWER **FOUR (4)** QUESTIONS ONLY

THIS QUESTION PAPER CONSISTS OF SEVEN (7) PAGES

Q1 (a) There are five hydroelectric power stations in Malaysia, list all of the power stations.

(5 marks)

(b) With the aid of appropriate diagram, explain the advantages and disadvantages of loop primary circuit and ring main system.

(10 marks)

(c) Solar Energy is one of the types of generating power to the end user.

(i) Illustrate a diagram to show how it generates.
(ii) Briefly explain the operation of the system.

(10 marks)

Q2 (a) Per Unit system is the solution of an interconnected power system having several different voltage levels requires the cumbersome transformation of all impedances to a single voltage level. Prove that $Z_{pu} = Z_{act}\frac{VA}{V^2}$.

(5 marks)

(b) The equivalent circuit of one line diagram of a three phase power system network shown in Figure Q2 (b). Calculate and draw an impedance diagram and show all the impedance in per unit values. Select a common base of 100MVA at G_2.

(20 marks)

Q3 (a) Most of the transmission line system use overhead lines, but the power distribution within the city or crowded places is done using underground cables. Discuss about why overhead line construction is much less expensive compare with underground line system.

(5 marks)

(b) A three-phase transposed line is composed of 0.5cm radius wires two-conductor bundle with 10 m spacing measured from the center of the bundles as shown in Figure Q3 (b). The spacing between the conductors in the bundle is 50cm. Applying the concept of GMD and GMR to find

(i) The inductance of the complete line in mH/km.
(ii) The capacitance per phase per kilometer of the line.
(iii) If the length of the line is 120km and the normal operating voltage is 110kV, 50Hz frequency, calculate the inductance reactance and the capacitance reactance to neutral for the entire length of the line.

(20 marks)

Q4 (a) Fault is unintentional connecting together of two or more conductors which ordinary operates with a difference of potential between them.

(i) Draw the equivalent circuit of any one (1) possible three phase unbalanced fault that might occur in the transmission line of power system.

(4 marks)

(ii) Discuss two (2) advantages of doing fault analysis in power system application.

(4 marks)

(b) Consider the system shown in Figure Q4 (b), If there is a three phase fault at busbar A,

(i) Calculate the fault current in pu.
(ii) Calculate the fault MVA level.
(iii) Show all the steps of reduction block diagram technique.

(17 marks)

Q5 (a) Protection scheme is installed to clear and limit any damage to distribution equipment. Suitable and reliable protection should be installed in all circuits and electrical equipment to avoid any damages. Briefly explain the five (5) basis of design criteria required for proper protection of electrical power systems.

(7 marks)

(b) Draw a simple one line diagram with a basic equipment of power system include generation, transmission and distribution system to show how zones of protection is applied. Explain the characteristic of the protection zones.

(14 marks)

(c) Instrument transformer (current and voltage transformer) is one of the components of protective schemes. With the aid of appropriate diagram of instrument transformer, show how does it located in the network.

(4 marks)

Q6 (a) Explain the understanding of distribution system.

(5 marks)

(b) Explain in details the functions and applications of the following devices.

(i) Air Blast circuit breaker
(ii) Vacum circuit breakers
(iii) Disconnecting switches
(iv) Grounding transformer
(v) Surge arresters

(20 marks)

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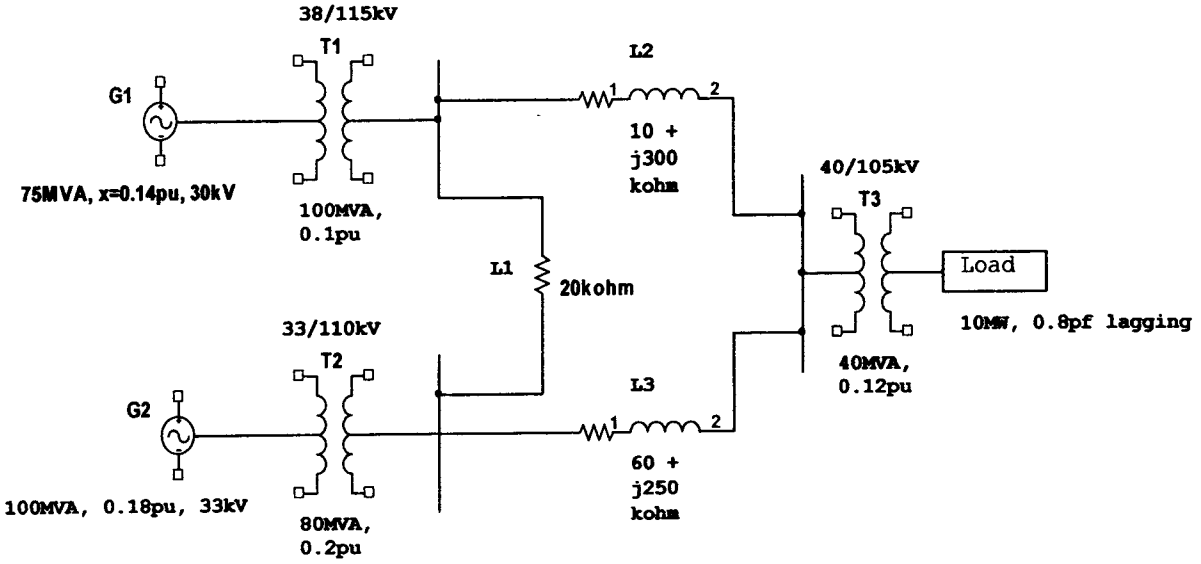

FIGURE Q2 (b)

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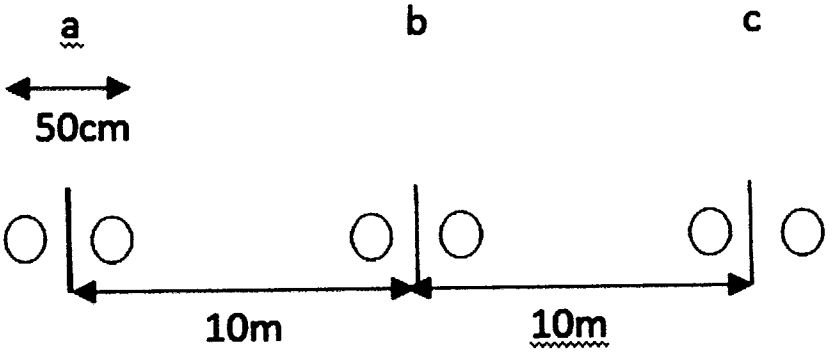

FIGURE Q3(b)

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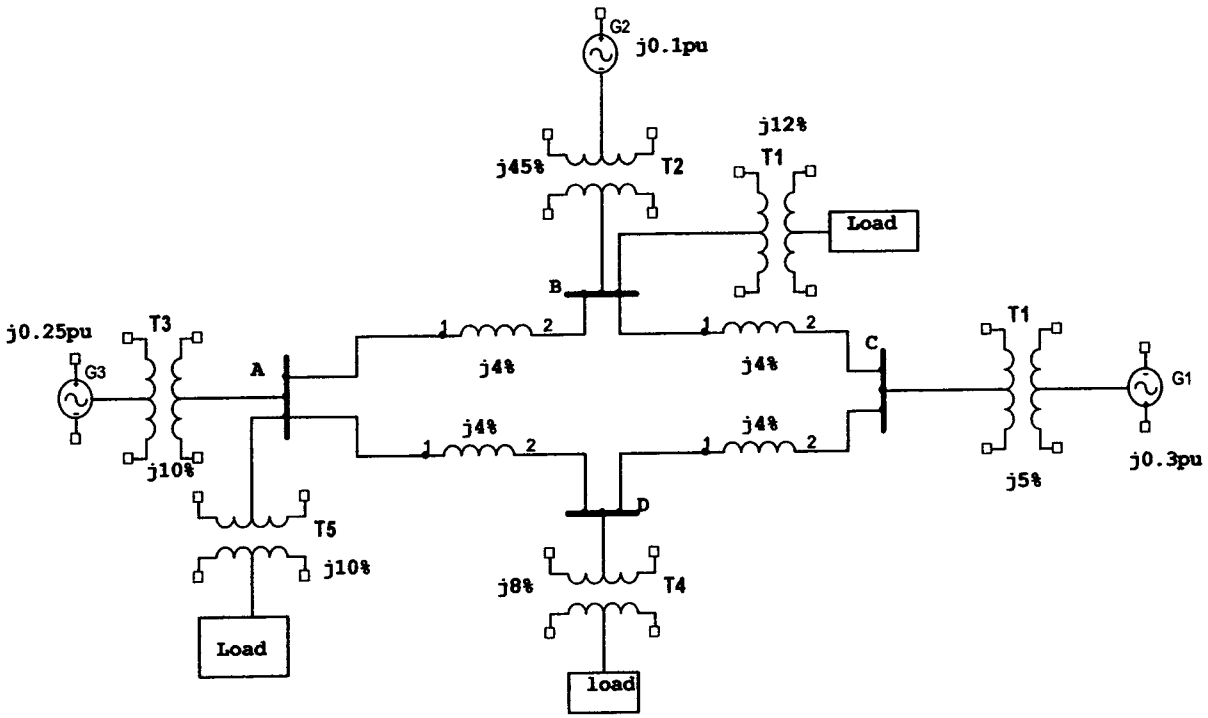

FIGURE Q4 (b)

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PEMBETULAN SOALAN DEK3213/DAE32403

Penambahan maklumat pada soalan berikut:

Q4 (b)

100MVA, 33kV as base values

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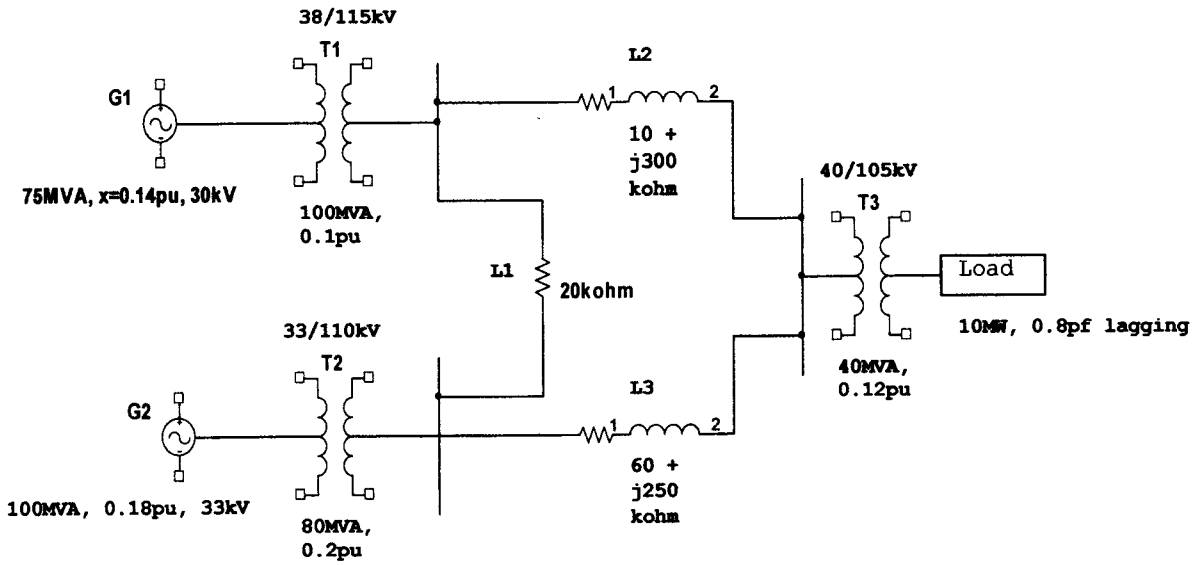

FIGURE Q2 (b)

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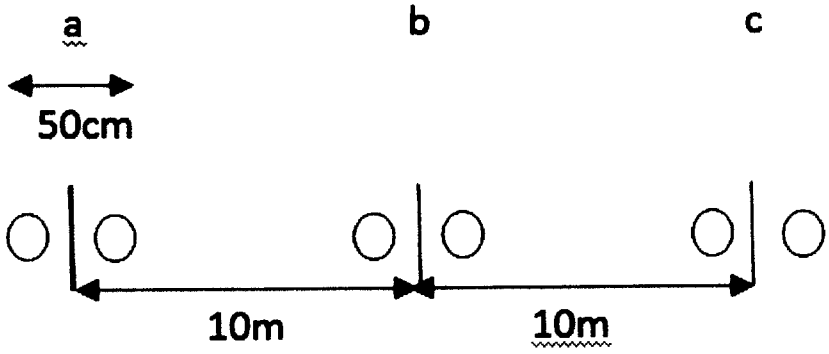

FIGURE Q3(b)

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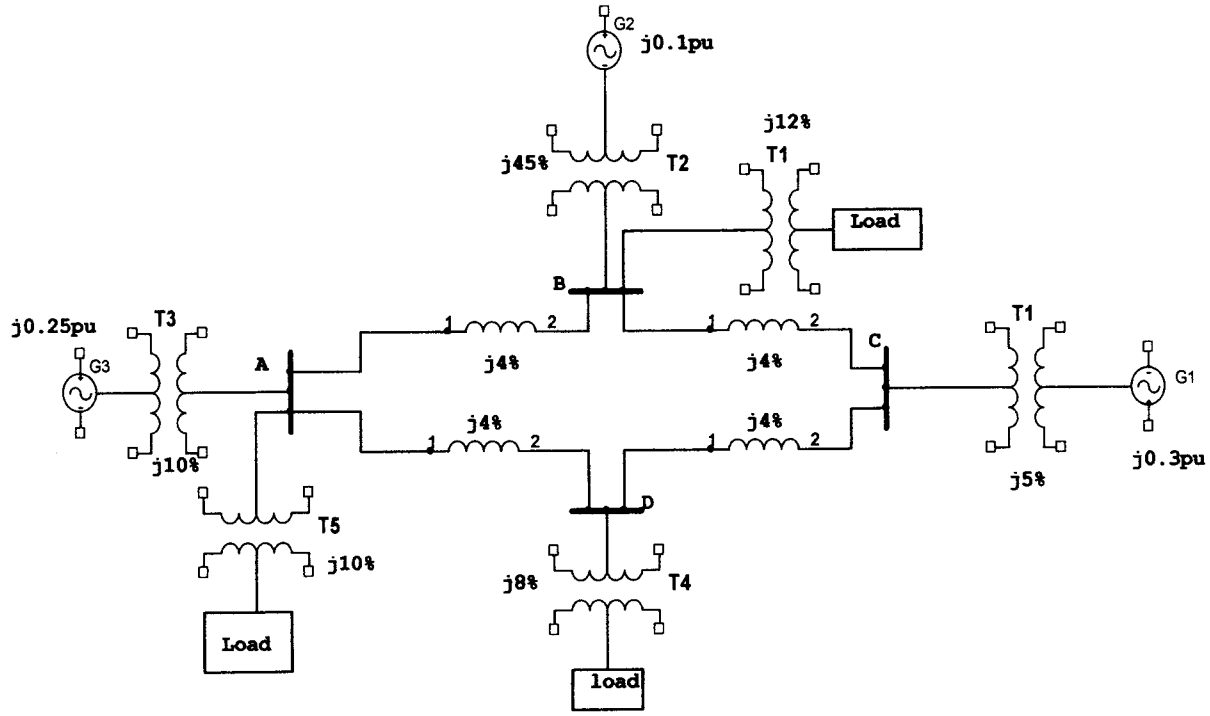

FIGURE Q4 (b)