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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER III
SESSION 2018/2019**

COURSE NAME : ELECTRICAL POWER SYSTEM
COURSE CODE : DAE 32403
PROGRAMME : DAE
EXAMINATION DATE : AUGUST 2019
DURATION : 3 HOURS
INSTRUCTIONS : ANSWER **FIVE (5)** QUESTIONS ONLY

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THIS QUESTION PAPER CONSISTS OF **EIGHT (8)** PAGES

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- 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) Determine how much active power and reactive power are supplied by the source shown in the circuit in **Figure Q2**. (10 marks)
- (b) Determine the apparent power and the overall power factor of the load. (5 marks)
- (c) Determine the line currents I_R , I_Y and I_B of the circuit and verify that the phasor sum of the line current is zero. (5 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 radial 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 **A** on the figure.
- Take the base kVA and the base kV for the system as 100 MVA and 11 kV respectively at the generator GS1, GS2 and GS3. (15 marks)

- Q4** (a) In the parallel circuit shown in **Figure Q4(a)**, $V_{AB} = 48.3 \angle 30^\circ$ Volt. Find the applied voltage V .
(5 marks)
- (b) Obtain the phasor voltages V_{AB} and V_{BC} for the circuit shown in **Figure Q4(b)**.
(5 marks)
- (c) A three-phase, four wire, nps system, with an rms line voltage of 120V, has three impedances of $20 \angle -30^\circ \Omega$ in a Y-connection. Determine the line currents and draw the voltage-current phasor diagram.
(10 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.
(6 marks)
- (b) Describe **four (4)** reasons of doing fault analysis in power system application.
(4 marks)
- (c) All the transmission lines shown in **Figure Q5(c)** has a reactance of $0.4 \Omega/\text{km}$. Using a base of 100 MVA obtain all the reactance as pu values and draw a reactance diagram for the system. If a fault occur at point C on the transmission line calculate :
(i) The fault current in amperes
(ii) The fault MVA
(10 marks)
- Q6** (a) Protection schemes must have high sensitivity in its operation when a fault occurs under minimum fault conditions. Write down 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)

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- (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) SF₆ circuit breaker

Give detail explanations of each of the above circuit breaker.

(10 marks)

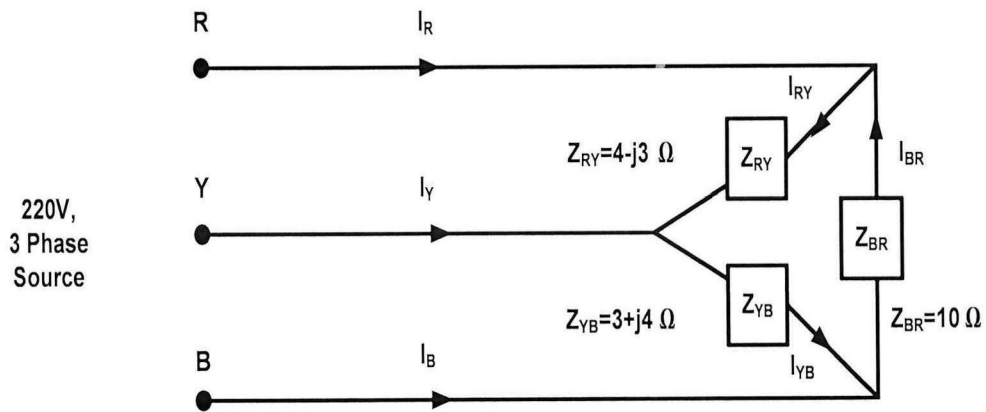
END OF QUESTIONS

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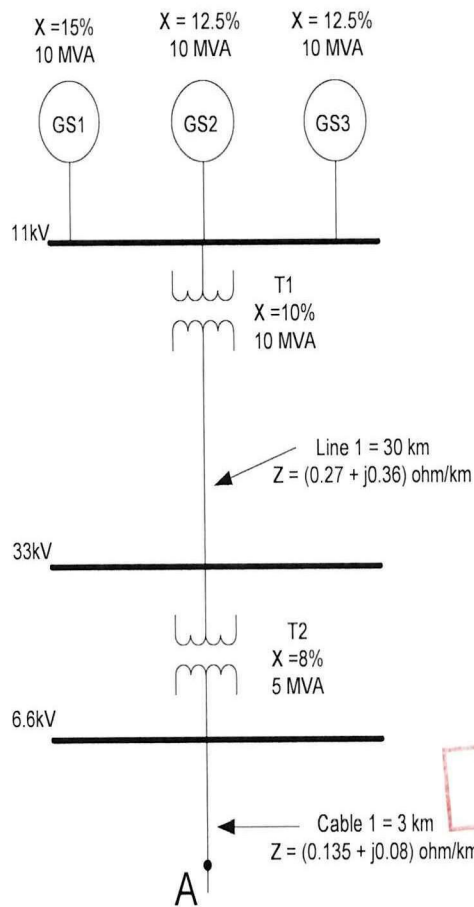
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FIGURE Q2(b)

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FIGURE Q3(b)

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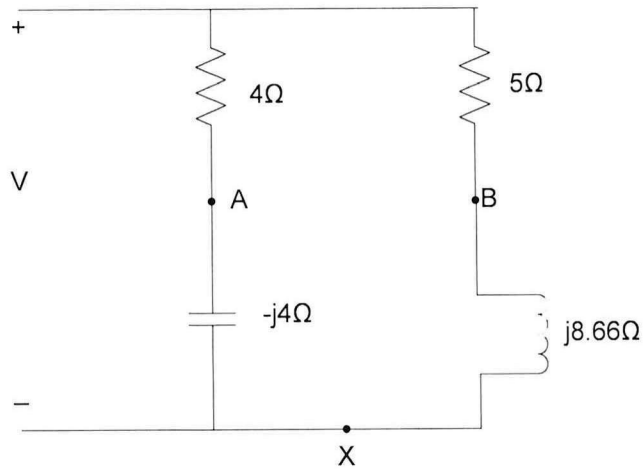


FIGURE Q4(a)

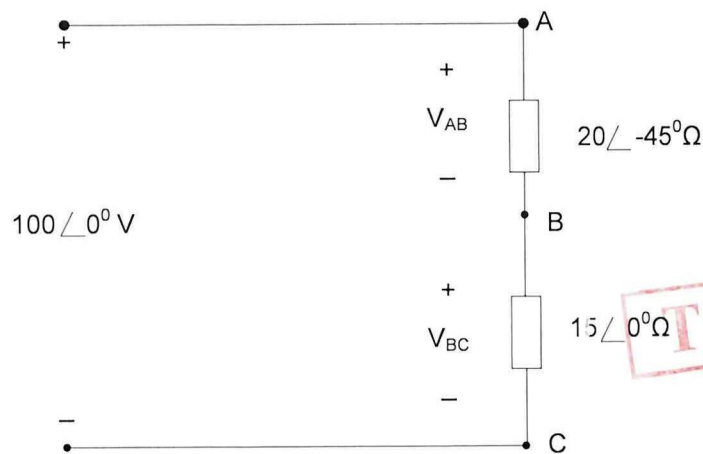


FIGURE Q4(b)

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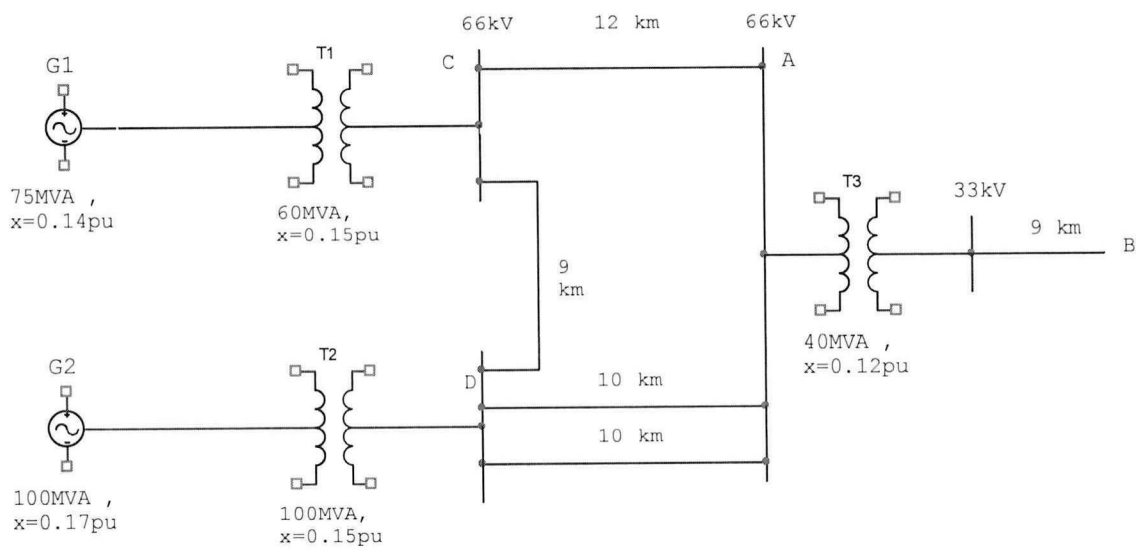


FIGURE Q5(c)

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