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UNIVERSITI TUN HUSSEIN ONN MALAYSIA

**FINAL EXAMINATION
SEMESTER I
SESSION 2013/2014**

COURSE NAME : POLYPHASE CIRCUIT ANALYSIS
COURSE CODE : BEF23803
PROGRAMME : BEV
EXAMINATION DATE : JANUARY 2014
DURATION : 3 HOURS
INSTRUCTION : ANSWER ALL QUESTIONS

THIS QUESTION PAPER CONSISTS OF **FOUR (4)** PAGES

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Q1 (a) List four (4) advantages of alternating current (AC) when compared with direct current (DC). State the definition of instantaneous power and derive the equation.

(14 marks)

(b) A sinusoidal effective voltage of 230V is supplied to a parallel load of Z_1 and Z_2 of $3 + j5\Omega$ and 7Ω , respectively. Analyze the total impedance, source current, real and reactive power delivered, complex power, power factor, and state whether the circuit is capacitive or inductive

(11 marks)

Q2 (a) Explain the advantages of three-phase system when compared with single-phase system and prove a balance three-phase instantaneous power is constant.

(17 marks)

(b) Each phase of a balanced three-phase Δ -connected load consists of 0.3H inductor in parallel with the series combination of $3\mu\text{F}$ capacitor and 300Ω resistance. Assume zero line resistance and a phase voltage of 240V at 50Hz. Examine the total impedance, phase current, line current, power factor, phase power and total power absorbed by the load.

(8 marks)

Q3 (a) With the aid of diagram, draw and explain briefly four major components in three-phase network system. Draw the symbol of power circuit breaker and fuse.

(10 marks)

(b) A three-generator system illustrated in **Figure Q3(b)** has the following parameters:

	Line L1 = 110 Ω	Line L2 = 70 Ω	Line L3 = 70 Ω
G1	110 MVA	11 kV	x = 21%
G2	150 MVA	16 kV	x = 11%
G3	210 MVA	21 kV	x = 13%
T1	150 MVA	11/132 kV	x = 3%
T2	210 MVA	16/132/kV	x = 11%
T3	250 MVA	21/132 kV	x = 3%

Find all reactance in per unit on 110 MVA and 11 kV base. Draw the final reactance diagram.

(15 marks)

- Q4** (a) Compare the conventional and modern distribution in electrical power system. Differentiate between short, medium and long transmission line. (12 marks)
- (b) A 240-kV, 50Hz, three-phase transmission line is 70 km long. The resistance per phase is 0.11Ω per km and the inductance per phase is 1.1mH per km. The shunt capacitance is negligible. Use the suitable transmission line model to find the voltage and power at sending end, voltage regulation, and efficiency when the line is supplying a three-phase load of 410 MVA at 0.85 power factor lagging at 240 kV. (13 marks)

- END OF QUESTION -

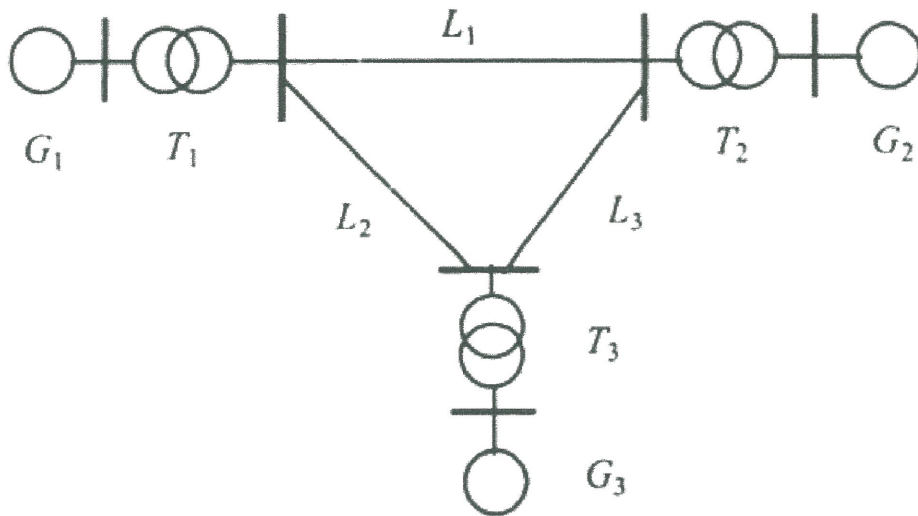
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**FIGURE Q3(b)**