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CONFIDENTIAL

SET A

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JANUARY 2011 SESSION

SUBJECT CODE	:	FEB 10202
SUBJECT TITLE	:	ELECTRICAL PRINCIPLES
LEVEL	:	BACHELOR
TIME / DURATION	:	3.30pm – 6.00pm (2.5 HOURS)
DATE	:	09 MAY 2011

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. Please write your answers on the answer booklet provided.
4. Answer should be written in blue or black ink except for sketching, graphic and illustration.
5. This question paper consists of TWO (2) sections. Section A and B. Answer all questions in Section A. For Section B, answer three (3) questions only.
6. Answer all questions in English.

THERE ARE 5 PAGES OF QUESTIONS AND 1 PAGE OF APPENDIX, EXCLUDING THIS PAGE

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer booklet provided.

Question 1

a) State the Kirchoff's Voltage Law and Kirchoff's Current Law

(4 marks)

b) Convert the following SI units

i. 4.2×10^{-2} m^2 to square centimeters
ii. 15.43×10^{-6} kV to millivolts
iii. 10.45×10^{5} mW to kilowatts

(4 marks)

c) Based on the circuit in **Figure 1**, determine:

i. The total resistance of the circuit.
ii. The voltage across each resistor.
iii. The current flow in R_2.
iv. The power dissipated in R_2.

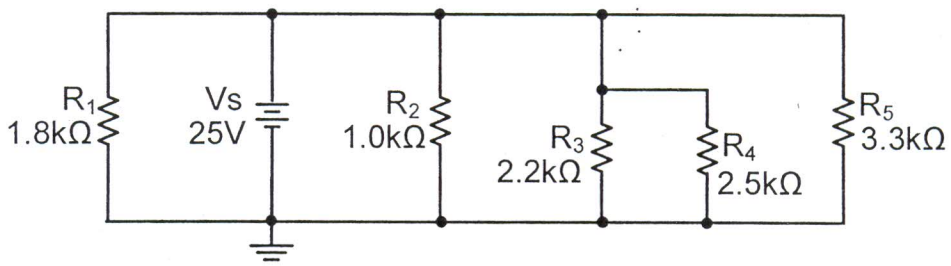

Figure 1

(12 marks)

Question 2

(a) State three (3) applications of capacitor in electrical and electronic area.

(3 marks)

(b) Prove that the summation of resistor in parallel is given by

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + ... + \frac{1}{R_n}$$

(4 marks)

(c) If i(t) = 14 sin (4π x 100t) mA, determine

i. The peak and rms value of the current

ii. The angular velocity and frequency

iii. The value of voltage at t = 0 s, 1.25 ms, 2.5 ms and 3.75 ms

iv. Sketch the waveform with the time in seconds

(13 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Answer THREE (3) questions only

Please use the answer booklet provided.

Question 3

Based on the circuit in **Figure 2**:

(a) When the switch at position B, determine:

i. The total resistance of the circuit.

ii. The current measured in meter A.

iii. The current flow in R.

(10 marks)

(b) When switch at position C, determine:

i. The total resistance of the circuit.

ii. The current measured in meter C.

iii. The total amount of power in the circuit.

(10 marks)

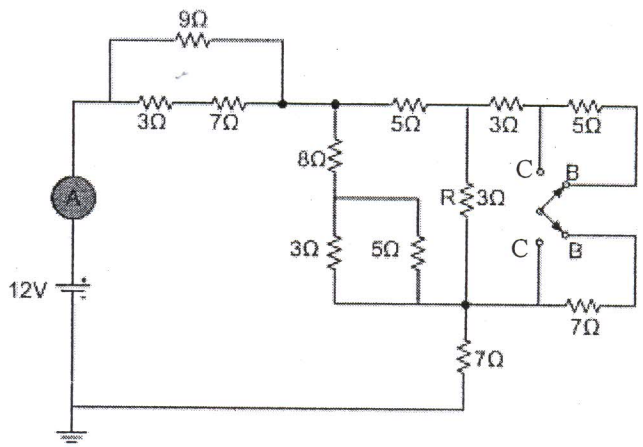

Figure 2

Question 4

For the series-parallel arrangement shown in **Figure 3**, determine:

(a) the equivalent series circuit impedance Z_T
(b) the supply current I
(c) the circuit phase angle and power factor PF
(d) voltages V_1 and V_2
(e) currents I_A and I_B
(f) total true power, P_{true}
(g) total reactive power, P_r

(20 marks)

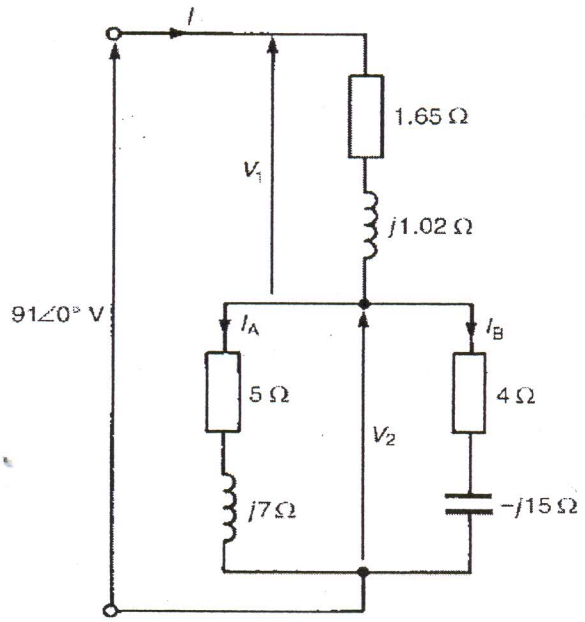

Figure 3

Question 5

In **Figure 4** each phase voltage has magnitude 415 Vrms. The phase sequence is ABC with $e_{AN} = 415 \angle 0^0$ V. Determine

i. each line voltage
ii. each phase current
iii. each line current
iv. the total average power delivered to the load
v. the total reactive power delivered to the load
vi. the total apparent power delivered to the load
vii. the power factor

(20 marks)

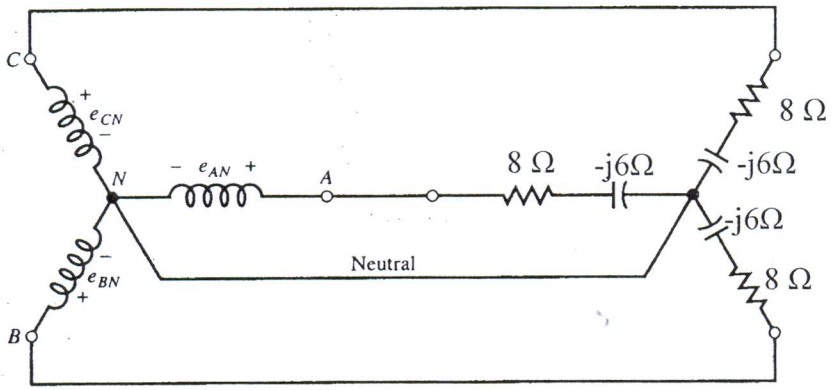

Figure 4

Question 6

(a) Name type of transformer in **Figure 5** and determine the magnitude of e_1,e_2 and e_3 in the circuit .

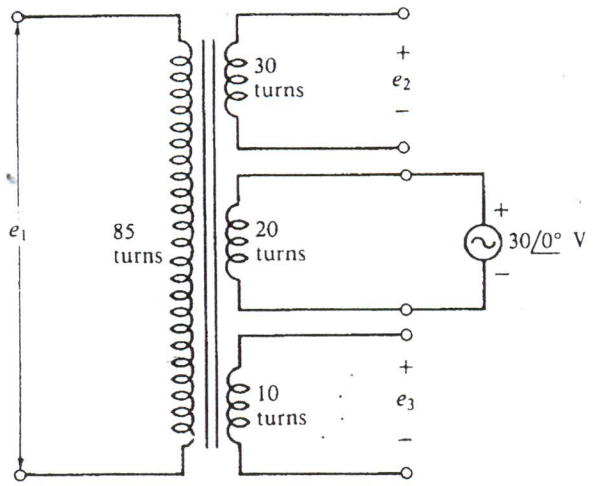

Figure 5

(10 marks)

(b) A transformer having an efficiency of 92% delivers 500 W to a load.

i. If the copper loss is 1.5% of the load power, determine the core loss

ii. If the magnitude of the primary current is 10 A pk, determine the magnitude of the supplied voltage supplied by the source connected to the primary winding.

(10 marks)

END OF QUESTION PAPER

Appendix

FORMULA

CAPACITANCE	TRANSFORMER
Capacitance , $C = \frac{Q}{V}$	Turns ratio , $n = \frac{N_{\text{sec}}}{N_{prim}} = \frac{V_{\text{sec}}}{V_{prim}} = \frac{I_{prim}}{I_{\text{sec}}}$
Capacitance, $C = \frac{A \cdot \varepsilon_r \cdot (8.85 \times 10^{-12}\ \text{F/m})}{d}$	
Capacitive reactance, $C = \frac{1}{2\pi \cdot f \cdot C}$	
INDUCTANCE	
Inductance, L = $\frac{N^2 \times \mu \times A}{l}$	
Inductive reactance, $X_L = 2\pi \cdot f \cdot L$	