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CONFIDENTIAL

SET B

UNIVERSITI KUALA LUMPUR
Malaysia France Institute

FINAL EXAMINATION

JANUARY 2011 SESSION

SUBJECT CODE	:	FED 10502
SUBJECT TITLE	:	ELECTRICAL TECHNOLOGY
LEVEL	:	DIPLOMA
TIME / DURATION	:	9.00am – 11.00 (2 HOURS)
DATE	:	15 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. Answers 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 TWO (2) questions only.
6. Answer all questions in English.

THERE ARE 5 PAGES OF QUESTIONS, EXCLUDING THIS PAGE.

SECTION A (Total: 60 marks)

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

Question 1

(a) The current in an a.c circuit at any time *t* is given by $i = 120 \sin(100\pi t + 0.36)$ A.

Find :

i. The peak value (V_P), the peak to peak value (V_{PP}), the periodic time (T), the frequency (f) and phase angle (θ) relative to 120 sin(100π t).

(8 marks)

ii. The value of the current when t = 8ms.

(4 marks)

iii. The time when the current is first reaches a maximum.

(4 marks)

iv. The value of voltage $v_L(t)$ when the above value of current through 40 mH inductor.

(4 marks)

(b) Calculate the value of capacitance C should be used in **Figure 1**, to make the current *i* have the same phase as the voltage *e(t)*?

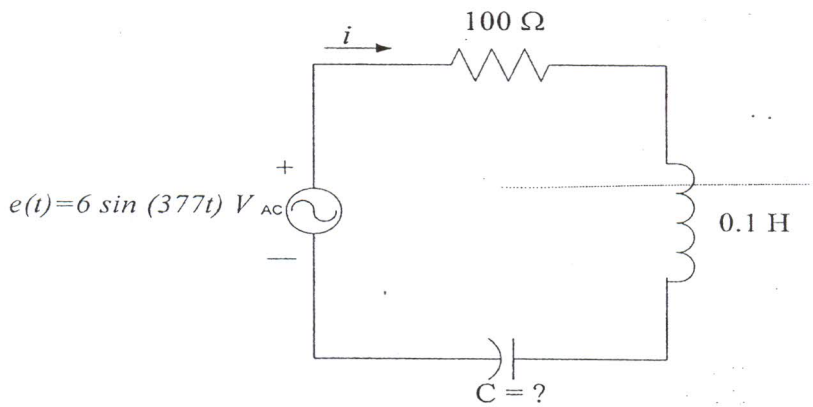

Figure 1

(10 marks)

Question 2

(a) Two coils A and B are connected in series across a 240 V, 50 Hz supply shows in **Figure 2**. The resistance of A is 5 Ω and the inductance of B is 0.015 H. If the input from the supply is 3 kW and 2 kVAR,

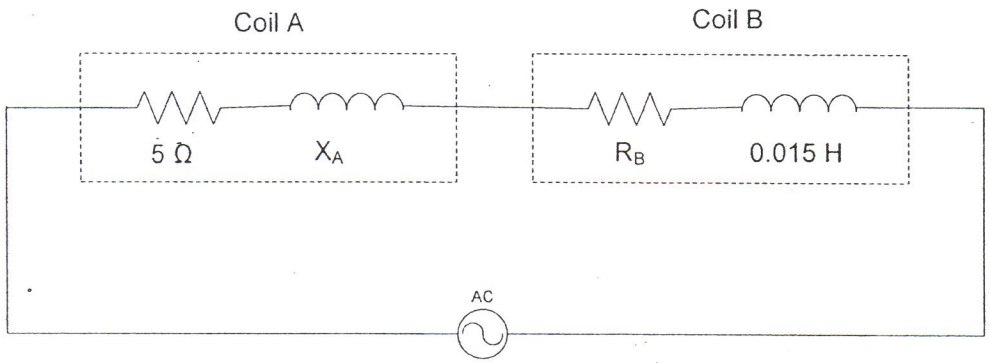

Figure 2

i. find the inductance of A and the resistance of B.

(9 marks)

ii. calculate the voltage across each coil.

(6 marks)

(b) In **Figure 3**, A 3-phase, 37.3 kW, 440 V, 50 Hz induction motor operates on full load with an efficiency of 89% and at a power factor of 0.85 lagging. Calculate the total apparent power (kVA) rating of capacitors required to raise the full load power factor to 0.95 lagging. Determine also the capacitance per phase (μF) if the capacitors are in delta connected.

(15 marks)

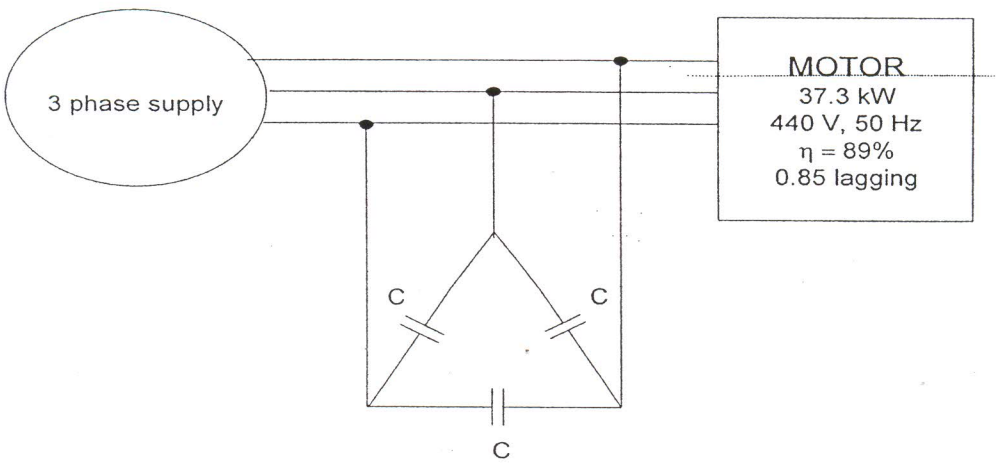

Figure 3

SECTION B (Total: 40 marks)

INSTRUCTION: Answer TWO question only.
Please use the answer booklet provided.

Question 3

(a) Use superposition to find V_0 in the circuit shows in **Figure 4**;

(14 marks)

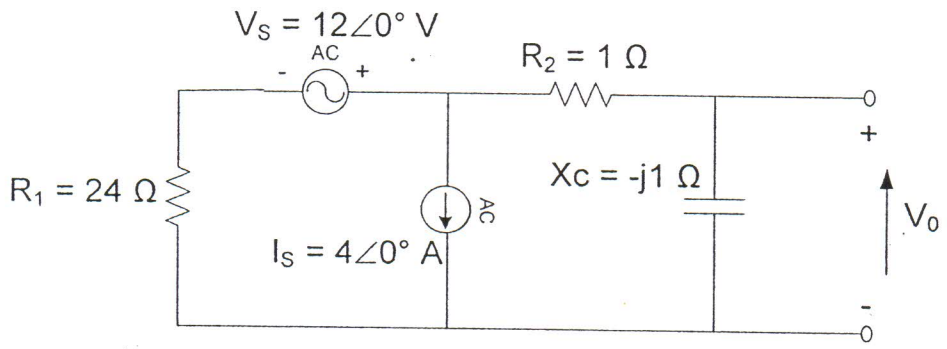

Figure 4

(b) A coil of resistance 25 Ω and inductance 100 mH is connected in series with a capacitance of 0.12 μF across a 200 V, variable frequency. Calculate ;

i. The resonant frequency

(2 marks)

ii. The current at resonance

(2 marks)

iii. The factor by which the voltage across the reactance is greater than the supply voltage.

(2 marks)

Question 4

(a) Refer to **Figure 5** and determine the current through the load R_L using Thevenin Theorem.

(10 marks)

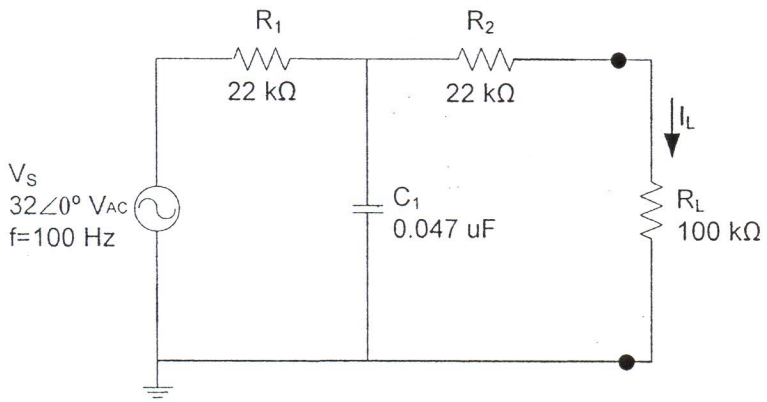

Figure 5

(b) For the power system shown in **Figure 6**, find:

i. the total apparent power and the power factor.

(5 marks)

ii. the total current i_T in polar form.

(5 marks)

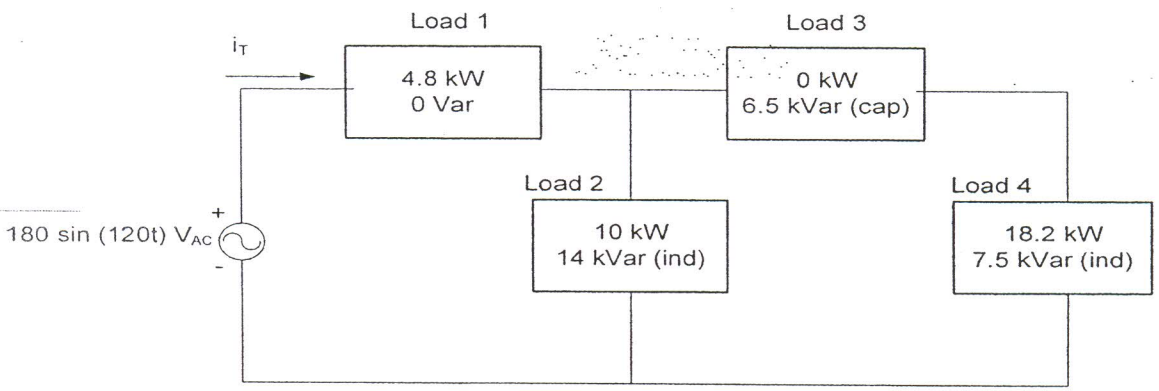

Figure 6

Question 5

Figure 7 shows a three phase star-connected load impedances $Z_1 = 20 + j37.7\ \Omega$ per phase are parallel with another connected impedances $Z_2 = 30 - j159.3\ \Omega$. The phase voltage of generator is 398 volts. Determine:

(a) impedance total per phase (3 marks)

(b) load voltage per phase (3 marks)

(c) the line current (I_L) (6 marks)

(d) the power factor (cos θ) (2 marks)

(e) the active power (W) (3 marks)

(f) the reactive power (Var) (3 marks)

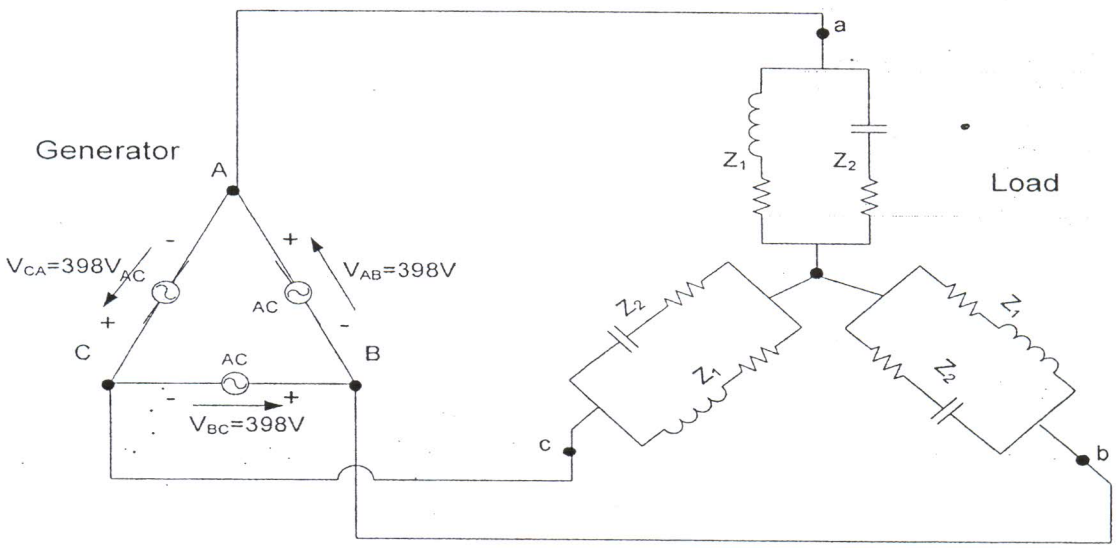

Figure 7

END OF QUESTION PAPER