UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2008/2009

SUBJECT NAME	:	ELECTRICAL TECHNOLOGY
SUBJECT CODE	:	BEE 1223
COURSE	:	1 BEE
EXAMINATION DATE	:	APRIL/MAY 2009
DURATION	:	2 1/2 HOURS
INSTRUCTIONS	:	ANSWER ANY FOUR (4) QUESTIONS FROM THE SEVEN (7) QUESTIONS GIVEN

THIS QUESTION PAPER CONSISTS OF SIX (6) PAGES

Q1 (a) A current source in a linear circuit has $i_s = 5 \cos (2000t - 25°)$ A .

(i) Find the amplitude of the current

(ii) Find the period of the current

(iii) Find the frequency of the current

(iv) Calculate i_s at $t = 3.0$ ms

(10 marks)

(b) Convert $v_L = 100 \sin (2000t + 180°)$ to cosine form.

(3 marks)

(c) Given the complex numbers $z_1 = -3 + j4$ and $z_2 = 12 + j5$, find :

(i) $z_1 z_2$

(ii) $\dfrac{z_1}{z_2^*}$

(iii) $\dfrac{z_1 + z_2}{z_1 - z_2}$

(iv) $3z_1^* z_2$

(12 marks)

Q2 (a) Explain briefly the time-domain and frequency-domain paradigms with aid of appropriate diagrams and equations. Is it possible to combine the time-domain and the frequency-domain paradigms in one axis for analysis purposes?. Give support of your answer.

(9 marks)

(b) The current in a series circuit of $R = 5\ \Omega$ and $L = 30$ mH lags the applied voltage by 80°. By drawing the impedance diagram, determine the source frequency and the impedance of this series circuit.

(8 marks)

(c) A series RC circuit with R= 27.5 Ω and C = 66.7 μF, has sinusoidal voltage and current, with angular frequency 1500 rad/s. Find the phase angle between the current and voltage.

(8 marks)

Q3 (a) Compute the equivalent impedance Z_{eq} and admittance Y_{eq} for the four - branch circuit as shown in Figure Q3(a).

(9 marks)

(b) The total current (I_1) entering the circuit as shown in Figure Q3(a) is $33.0\angle -13.0^0\ A$. Obtain the branch current I_2 and the voltage V_s.

(8 marks)

(c) Determine the current I_1 and I_2 in the parallel circuit of Figure Q3(c).

(8 marks)

Q4 (a) Briefly describe the node voltage method for a frequency domain network.

(9 marks)

(b) Using the node voltage method as in part (a) above, obtain the current I in the network of Figure Q4 (b).

(16 marks)

Q5 (a) Show that the line-to-line voltage V_{Line} in a three phase system is $\sqrt{3}$ times the line-to-neutral voltage V_{Phase}.

(7 marks)

(b) A three-phase, pps system, with a rms line voltage 70.7 V, has a balanced delta connected load with impedances $20\angle 45^0\Omega$. Obtain the line currents and draw the voltage-current phasor diagram.

(9 marks)

(c) A three-phase, three wire nps system, with a rms line voltage of 106.1V, has a balanced Y- connected load with impedances $5\angle -30^0\Omega$. Obtain the currents and draw the voltage-current phasor diagram.

(9 marks)

Q6 (a) Explain briefly the following terms :

Use an appropriate diagram or equations to support your explanations.

(i) Mutual inductance
(ii) Ideal transformer
(iii) Real transformer

(13 marks)

(b) A 150 kVA , 2400/240 V transformer has the following parameters:

$R_p = 0.2\ \Omega$ $X_p = 0.45\ \Omega$ $R_c = 10000\ \Omega$

$R_s = 0.002\ \Omega$ $X_s = 0.0045\ \Omega$ $X_m = 1550\ \Omega$

By using equivalent circuit referred to the primary :

(i) Calculate the primary voltage of the transformer at rated load with 0.8 lagging power factor
(ii) Determine the efficiency and voltage regulation of the transformer

(12 marks)

Q7 (a) Describe the characteristics of the following motors using an appropriate diagram and equations to support your explanations :

(i) DC shunt motor
(ii) DC series motor

(13 marks)

(b) A 250 V shunt generator has an armature resistance of 0.25 Ω and a field resistance of 125 Ω. At no load, the generator takes a line current of 5.0 A, while running at 1200 rpm. If the line current at full load is 52 A, calculate the full load speed.

(12 marks)

FINAL EXAMINATION

SEMESTER/SESSION	: II/2008/2009	COURSE	: 1 BEE
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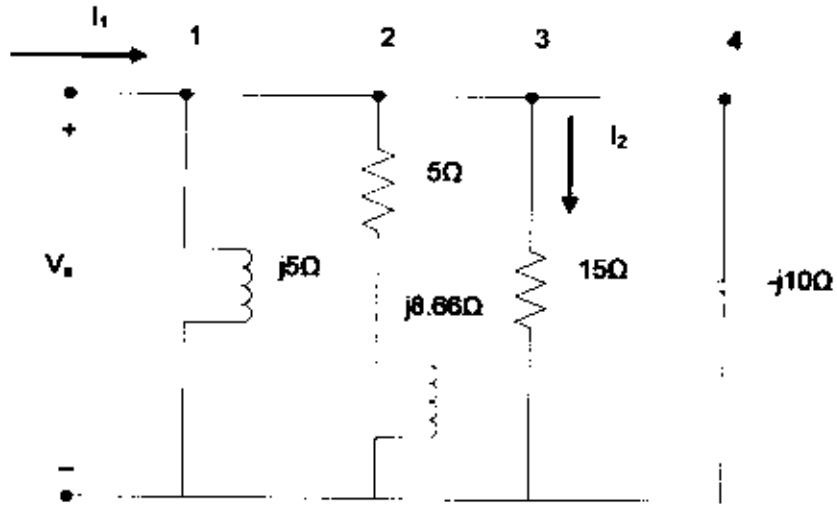

Figure Q3(a)

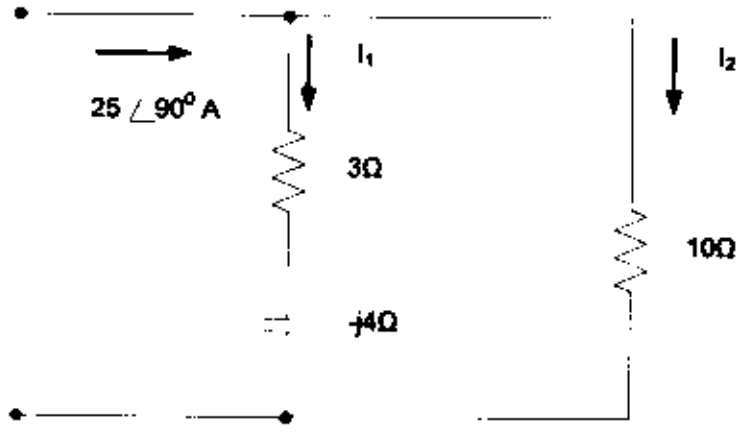

Figure Q3(c)

FINAL EXAMINATION

SEMESTER/SESSION	: II/2008/2009	COURSE	: 1 BEE
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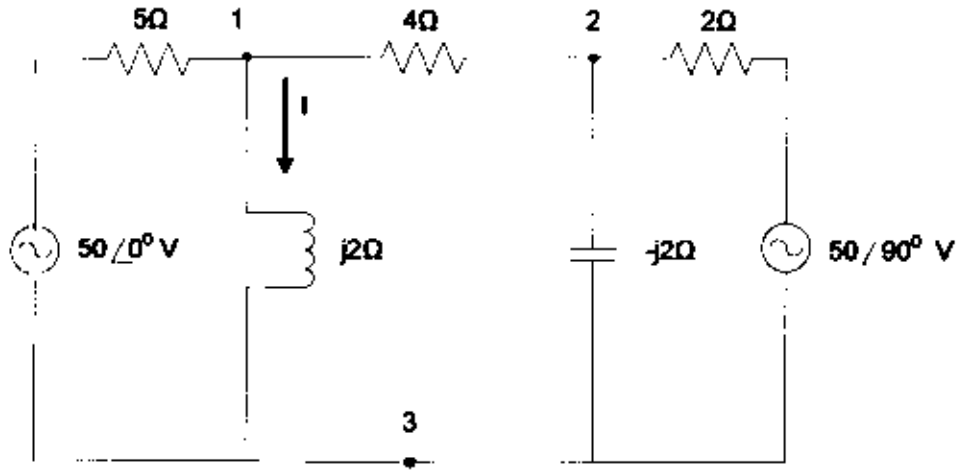

Figure Q4(b)

TABLE OF SPECIFICATION
FOR FINAL EXAMINATION QUESTION AND MAPPING OF SLO TO QUESTIONS

Programme	Bachelor Of Electrical and Electronic Engineering		
Code	: BEE 1223	Course	: ELECTRICAL TECHNOLOGY
Semester	: II	Session	: 2008/2009

SLO/ PLO		SLO Assessed (Fill In With % Marks for Cognitive Level Assessed)																																				PLO Assessed (tick / where needed)			
		1						2						3						4						5						6						7					
Cognitive Level		1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	3	4	5	6	1	2	4	5
Q1	(a)		10																																			✓	✓	✓	
	(b)		3																																			✓	✓	✓	
	(c)			12																																		✓	✓	✓	
Q2	(a)		9																																			✓	✓	✓	
	(b)			8																																		✓	✓	✓	
	(c)			8																																		✓	✓	✓	
Q3	(a)									9																												✓	✓	✓	
	(b)									8																												✓	✓	✓	
	(c)									8																												✓	✓	✓	
Q4	(a)														9																							✓	✓	✓	
	(b)															16																						✓	✓	✓	
	...																																								
Q5	(a)																			7																		✓	✓	✓	
	(b)																				9																	✓	✓	✓	
	(c)																				9																	✓	✓	✓	
Q6	(a)																									13												✓	✓	✓	
	(b)																												12									✓	✓	✓	
	...																																								
Q7	(a)																																13					✓	✓	✓	
	(b)																																		12			✓	✓	✓	
	...																																								
Total % Marks For Each Cognitive Level For Each SLO			22	28					25					9	16					7	18					13											13		12			

INSTRUCTIONS

1. Get the softcopy of the template 'Table Of Specification' from Puan Norida Kasim, through email.
2. Adjust the template accordingly suitable for the number of question and no. of SLO assessed.
3. Only consider PLO1, PLO2, PLO4 and PLO5, which is PLO concerns with Technical Competency
4. To simplify the overall assessment, each question assesses one PLO. But each PLO may be assessed by two Questions
5. Fill in the box within the SLO assessed, giving percentage marks for the related cognitive level
6. Calculate the total % marks for each cognitive level for each SLO.
7. Tabulate the grand total of each cognitive level.

Cognitive Level	
1	0
2	36
3	50
4	14
5	0
6	0
	100