INTI International College Penang

FINAL
ALTERNATIVE ASSESSMENT

(COVER PAGE)

Session	:	**August 2021**
Programme	:	Diploma in Electrical & Electronic Engineering (DEEI)
Course	:	**EEE1105: Circuit Theory & Electronic Devices**
Date of Examination	:	4 December 2021 (Saturday)
Time	:	8.00am – 11.00am Reading Time : Nil
Duration	:	3 Hours

Special Instructions :

This paper consists of **FOUR (4)** questions. All the questions carry equal marks.

Material permitted :

Non-Programmable Scientific Calculator

Materials provided :

Nil

Examiner(s)	:	**Dr Su Hsio Wei**
Chief Moderator	:	Chai Yoon Yik

*This paper consists of **6** printed pages, including the cover page*

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME (DEEI)
EEE1105: CIRCUIT THEORY & ELECTRONIC DEVICES
FINAL ALTERNATIVE ASSESSMENT: AUGUST 2021 SESSION

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Question 1 [25]

(a) A two sources circuit is shown in Figure Q1(a). Using nodal analysis, calculate the node voltages V_1, V_2 and V_3. [9]

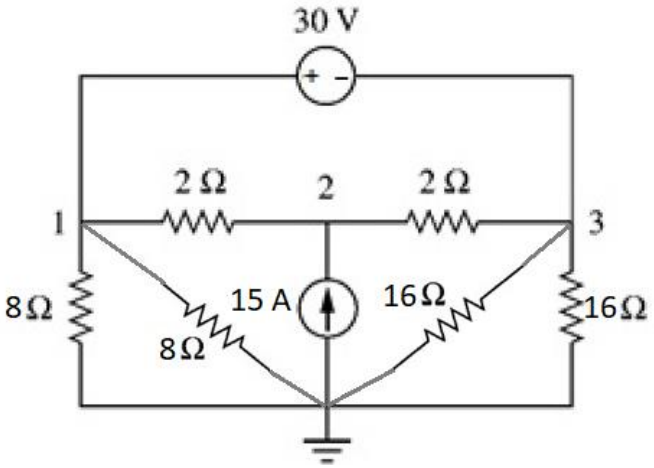

Figure Q1(a)

(b) In the network of Figure Q1(b), using mesh analysis, calculate I_o and V_{ab}. [9]

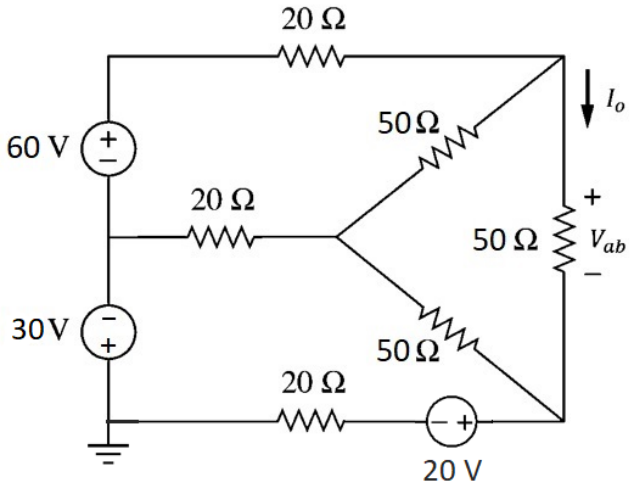

Figure Q1(b)

(c) Using superposition principle, find the current I through E_2 for the network in Figure Q1(c). [7]

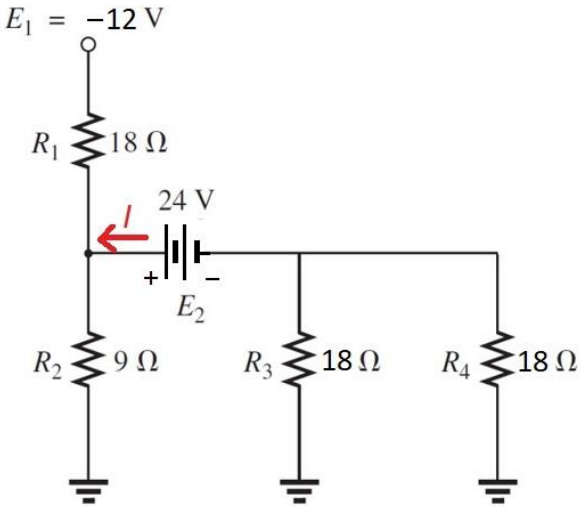

Figure Q1(c)

Question 2 [25]

(a) Figure Q2(a) shows an electrical circuit with an alternating current source of $5\angle 30°$ A.

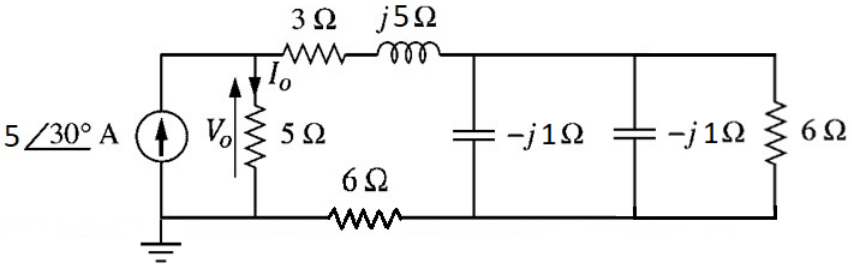

Figure Q2 (a)

Calculate:

(i) The current phasor I_o and voltage phasor V_o. [4]

(ii) The complex power and the power factor of the circuit. [2]

(iii) The average power delivered by the source. [2]

(iv) The reactive power of the circuit. [2]

(b) For the series RLC circuit in Figure Q2(b), find:

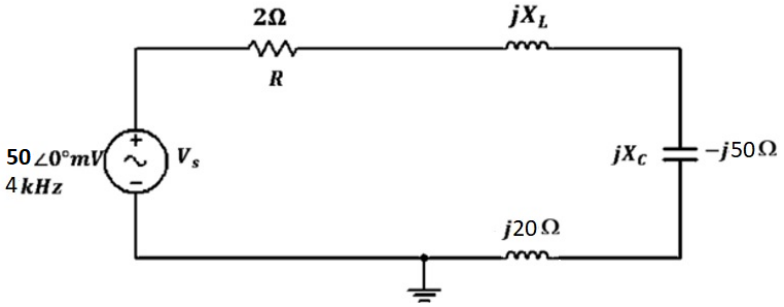

Figure Q2 (b)

(i)	The value of X_L for resonance.	[1]
(ii)	The magnitude of the circuit current, I at resonance.	[2]
(iii)	The voltage V_R, V_L and V_C at resonance.	[3]
(iv)	The quality factor of the circuit.	[1]
(v)	The value of total L and C at resonant frequency.	[2]
(vi)	The bandwidth of the frequency response.	[2]
(vii)	The low and high cutoff frequencies.	[2]
(viii)	The power dissipation at -3dB frequency.	[2]

Question 3 [25]

(a) Figure Q3(a) shows an RC circuit with the switch is opened at $t = 0$.

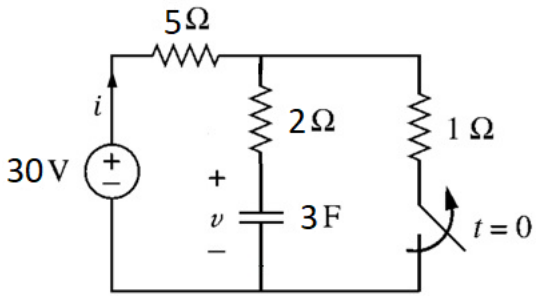

Figure Q3(a)

(i)	Determine the $v(t)$ and $i(t)$ at t = 0.	[2]
(ii)	Determine the $v(t)$ and $i(t)$ for $t > 0$.	[7]
(iii)	Sketch the $v(t)$ and $i(t)$ for (i) and (ii).	[4]
(iv)	Determine the energy stored in the capacitor at steady-state.	[2]

(b) Explain how to produce n-type and p-type silicon. List down their important properties. [4]

(c) For the network of Figure Q3(c), determine the maximum of V_i that will maintain V_L at 7.6V and not exceed the maximum power rating of the Zener diode. [6]

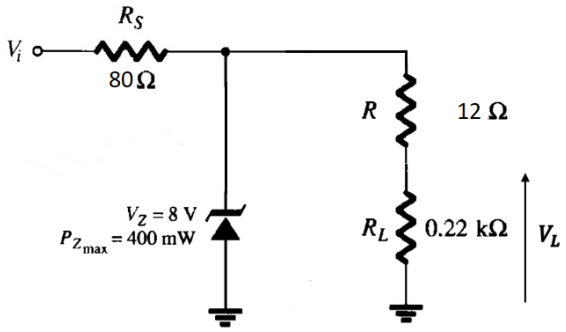

Figure Q3(c)

Question 4 [25]

(a) A bipolar junction transistor is connected in voltage-divider-bias configuration as shown in the Figure Q4(a).

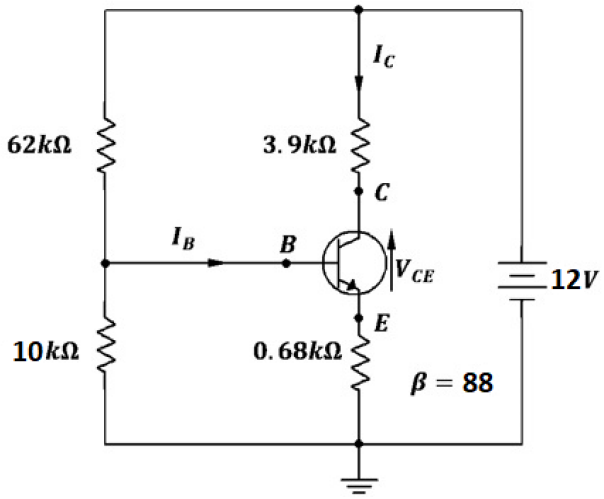

Figure Q4(a)

Using exact approach analysis, calculate:

(i) I_{BQ} [4]

(ii) I_{CQ} [1]

(iii) V_{CEQ} [2]

(iv) V_{CQ} [2]

(v) V_{EQ} [2]

(vi) V_{BQ} [2]

(vii) $transistor\ power\ dissipation$ [2]

(b) Figure Q4(b) shows an n-enhancement mode P-MOSFET circuit.

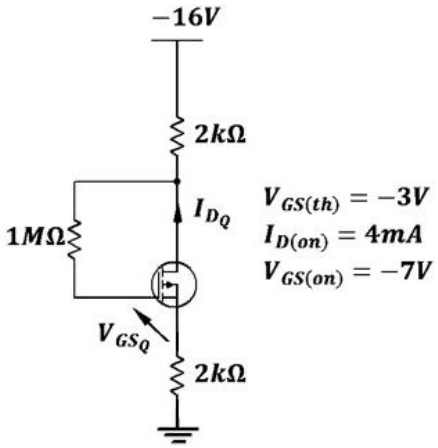

Figure Q4(b)

(i)	Draw the transfer characteristics and bias line of the circuit.	[5]
(ii)	Calculate the V_{GSQ} and I_{DQ}.	[2]
(iii)	Calculate the V_D.	[2]
(iv)	State the region of the drain characteristic the MOSFET operates in.	[1]

~THE END~

EEE1105 (F)/ August 2021 Session/ formatted