INTI
International College Penang

FINAL
Examination Paper

(COVER PAGE)

Session	:	**January 2018**
Programme	:	Diploma in Electrical and Electronic Engineering (DEEI)
Course	:	**EEE 1105: Circuit Theory & Electronic Devices**
Date of Examination	:	6 March 2018 (Tuesday)
Time	:	11:00am – 1:00pm Reading Time : Nil
Duration	:	2 Hours
Special Instructions	:	

This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

IMPORTANT NOTE : THIS PAPER SHOULD NOT BE TAKEN OUT OF THE EXAMINATION HALL

Materials permitted :

Non-Programmable Scientific Calculator

Materials provided :

Graph Papers (A4 size)

Examiner(s)	:	**Mr. Steven Khoo Boo Tap**
Moderator	:	Mr. Kevin Tan Geok Su

*This paper consists of **10** printed pages, including the cover page.*

INTI INTERNATIONAL COLLEGE PENANG

DIPLOMA IN ELECTRICAL AND ELECTRONIC ENGINEERING PROGRAMME (DEEI)
EEE1105: CIRCUIT THEORY & ELECTRONIC DEVICES
FINAL EXAMINATION: JANUARY 2018 SESSION

Instructions: This paper consists of **SIX (6)** questions. Answer any **FOUR (4)** questions in the answer booklet provided. All questions carry equal marks.

Question 1

(a) Find the current passing through 4 Ω resistor using Superposition Theorem for Figure 1(a). (12 marks)

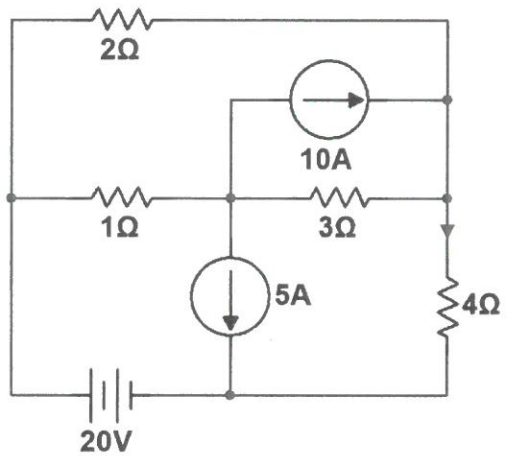

Figure 1(a)

(b) Find the current passing through 15 Ω resistor using Nodal analysis and the voltage across the 10 A current source in the circuit of Figure 1(b).

(13 marks)

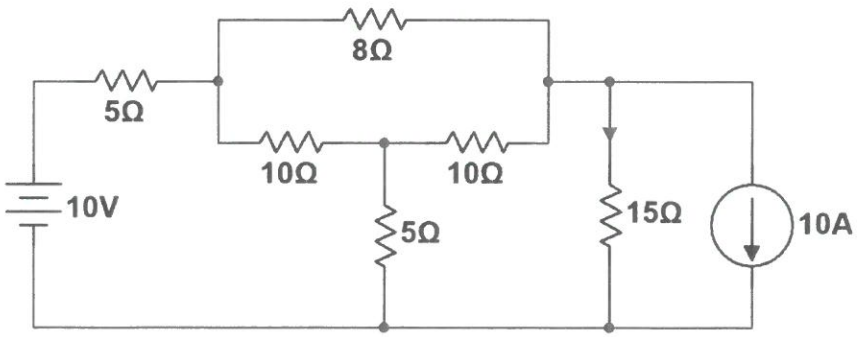

Figure 1(b)

Question 2

(a) A circuit as shown in Figure 2(a) having a resistance of 0.1k Ω, an inductance of 1000 mH and a capacitance of 0.005 mF in series, is connected across a 120∠0° V, 0.0796 kHz supply. Calculate:

(i) the impedance in polar form;

(4 marks)

(ii) the current in polar form;

(2 marks)

(iii) the voltages across R, C and L in polar form;

(6 marks)

(iv) the power factor and phase angle.

(3 marks)

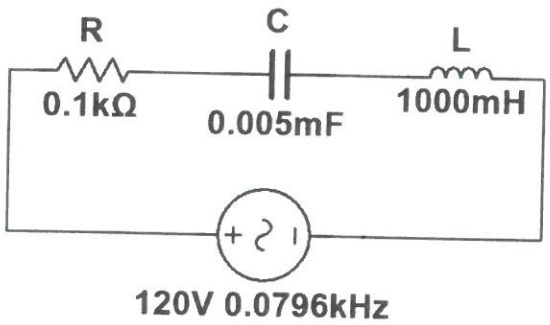

Figure 2(a)

(b) A network is arranged as in Figure 2(b). Calculate the equivalent resistance between node W and X.

(10 marks)

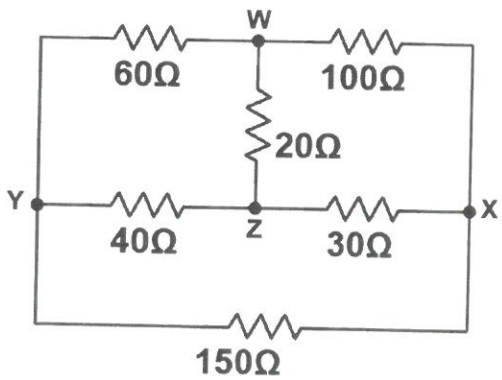

Figure 2(b)

Question 3

(a) For the series diode configuration of Figure 3(a)(i), employing the diode characteristics of Figure 3(a)(ii). Determine the V_{DQ}, I_{DQ} and V_R. Sketch the load line graph of I_D (mA) versus V_D (V).

(10 marks)

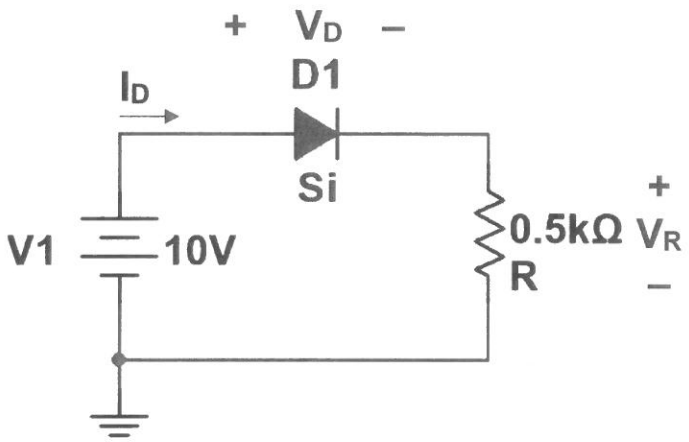

Figure 3(a)(i)

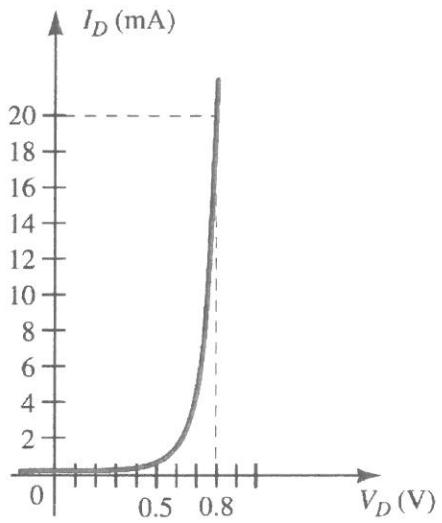

Figure 3(a)(ii)

(b) For the Zener diode network of Figure 3(b), determine V_L, V_R, I_Z and P_Z. Determine what happens when the load resistance, R_L changed with 3 kΩ resistor?

(10 marks)

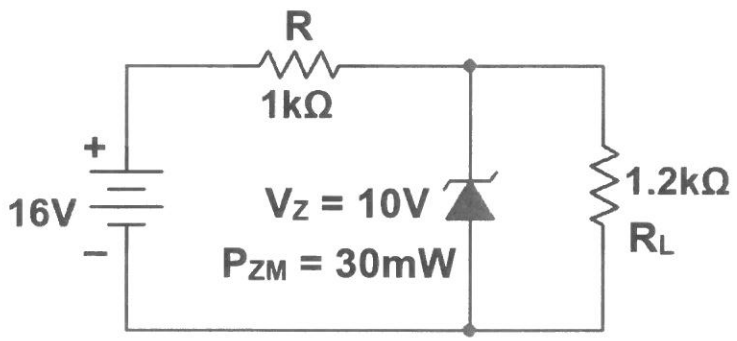

Figure 3(b)

(c) Solve the current, $I_{20\Omega}$ using Mesh analysis for Figure 3(c).

(5 marks)

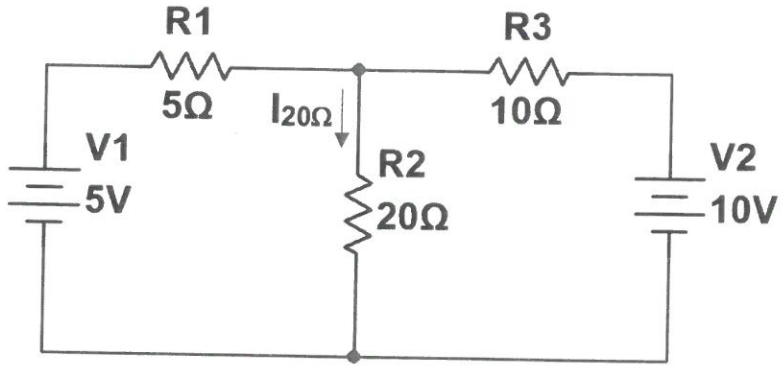

Figure 3(c)

Question 4

(a) Find β_{ac} for the transistor characteristics of Figure 4(a) at $I_C = 7\ mA$ and $V_{CE} = 5\ V$.

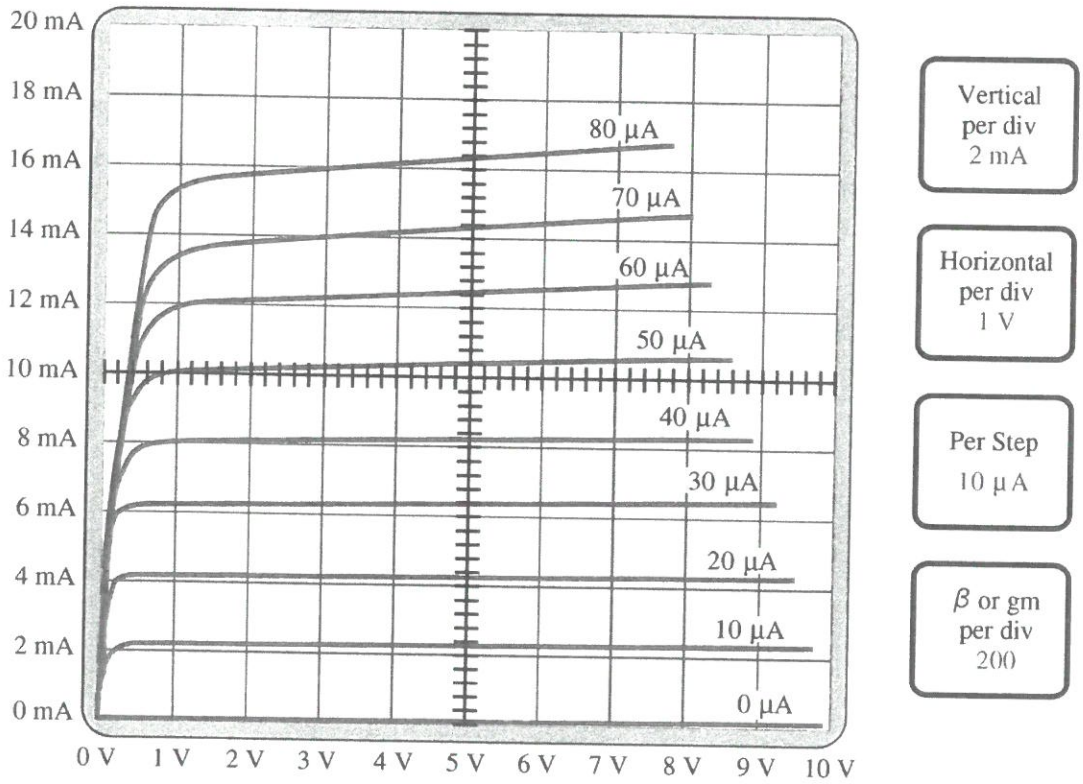

Figure 4(a)

(4 marks)

(b) For the circuit shown in Figure 4(b), find I_C and V_{CE}. Next, sketch the load line with proper labeling. Assume the $\beta = 100$.

(7 marks)

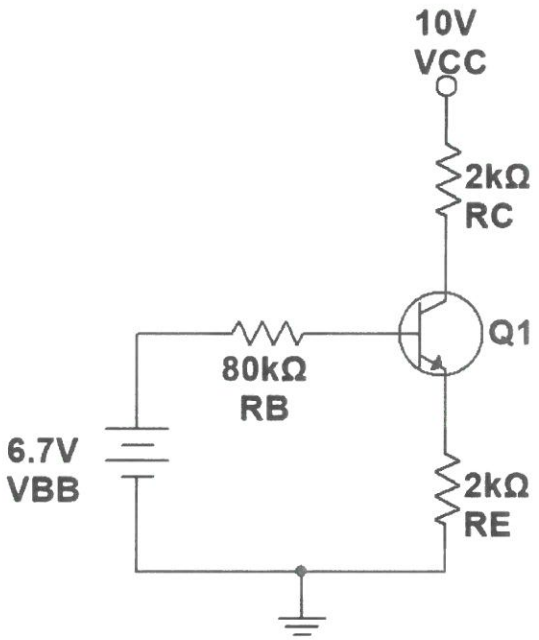

Figure 4(b)

(c) Compute R_B and R_C for the transistor inverter of Figure 4(c) if $I_{C_{sat}} = 10\,mA$. Use a standard resistor values for R_B and R_C. Also, sketch the output waveform of Figure 4(c).

(6 marks)

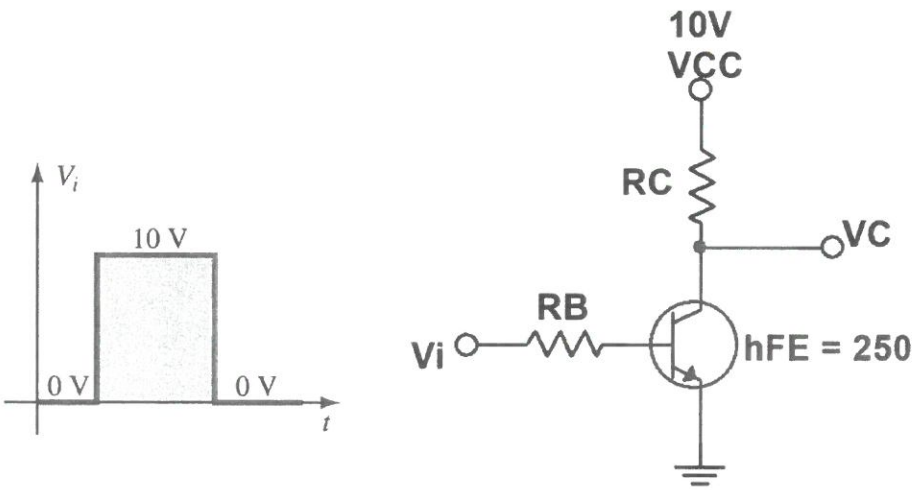

Figure 4(c)

(d) Determine how much the Q-point (I_E, V_{CE}) for the circuit in Figure 4(d). Assume $V_{BE} = 0.7$ V and $\beta = 100$.

(8 marks)

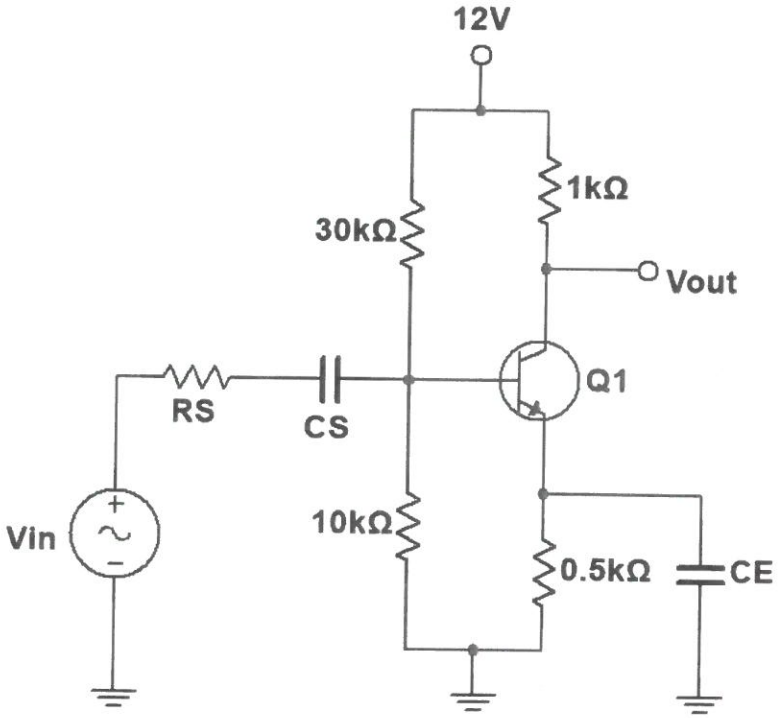

Figure 4(d)

Question 5

(a) Find the value of **L** in the circuit shown in Figure 5(a). Assume that the voltage supply, VS is $220\angle 0°$ V, 60 Hz. The total current is given as $11.81\angle -7.12°$ A. Also, find the total impedance and express in polar form.

(8 marks)

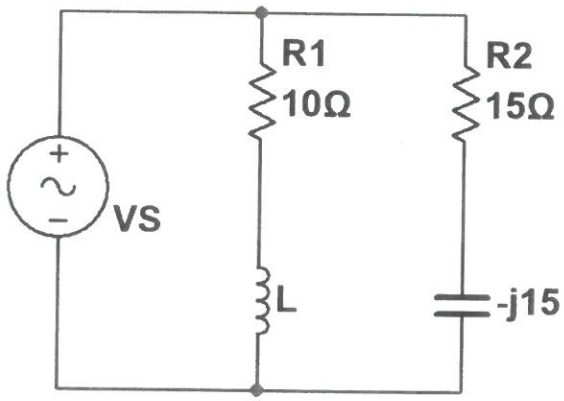

Figure 5(a)

(b) Compute V_{GSQ} and I_{DQ} for the circuit of Figure 5(b) using Mathematical approach. Sketch the Shockley curve to graphically estimate the I_{DQ}.

(7 marks)

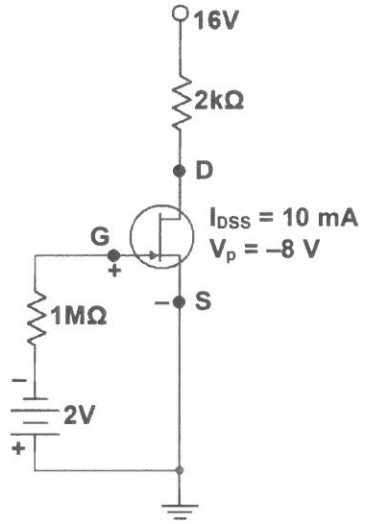

Figure 5(b)

(c) For the JFET biasing network in Figure 5(c), determine:

(i) The I_{DQ} and V_{GSQ}.

(6 marks)

(ii) The V_{DS} and V_{DG}.

(4 marks)

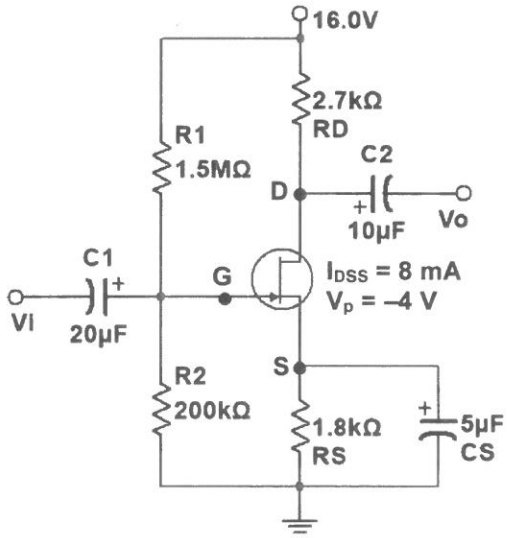

Figure 5(c)

Question 6

(a) Calculate the voltage drops across all components and the current passing through each components in the circuit in Figure 6(a), expressing them in complex (polar) form with magnitudes and phase angles each.

(7 marks)

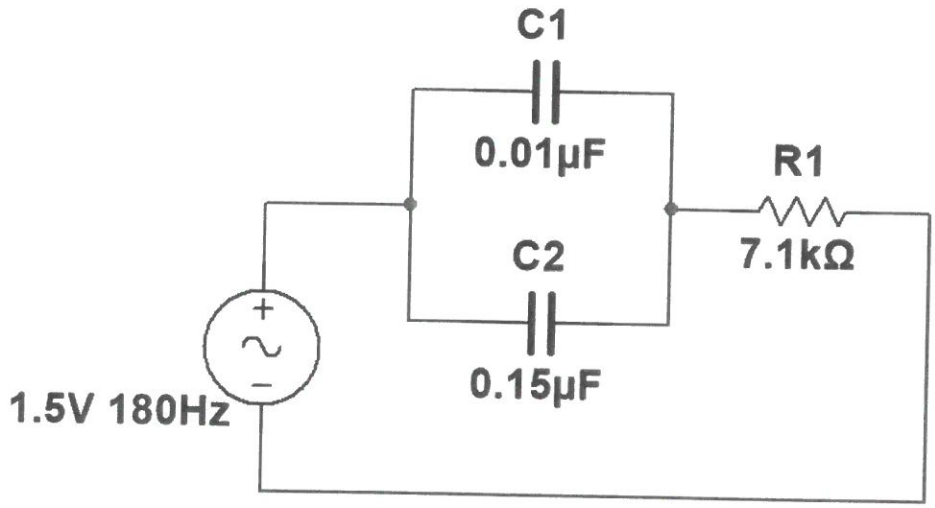

Figure 6(a)

(b) Calculate the current flowing through each component in Figure 6(b). Determine the phase angle (θ) between voltage supply and current in this circuit, express all answers in both polar and rectangular form.

Given:
$L_1 = 0.65$ H, $L_2 = 1200$ mH, $R_1 = 47$ kΩ, $R_2 = 22$ kΩ, $V_{supply} = 19.7$ V_{RMS}, Frequency supply = 5.4 kHz.

(8 marks)

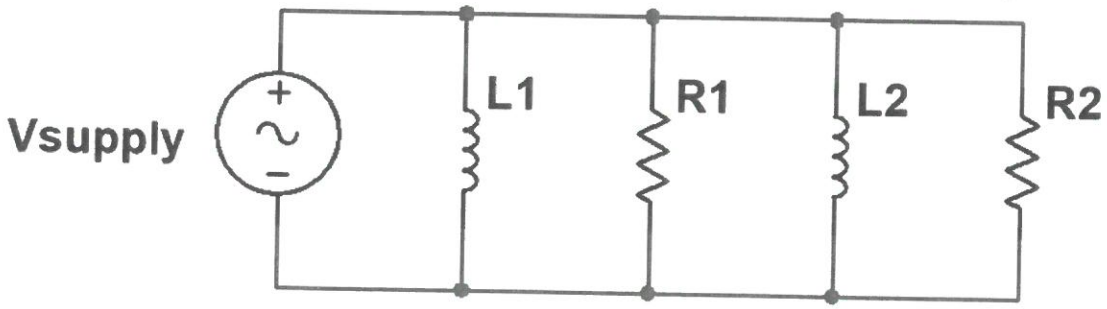

Figure 6(b)

(c) For the circuit shown in Figure 6(c), determine the current passing through, and the voltage drop across each element. Draw a phasor diagram showing all the voltages and currents. Assume the supply voltage is $173.2\angle 0°$ V, 50 Hz.

(10 marks)

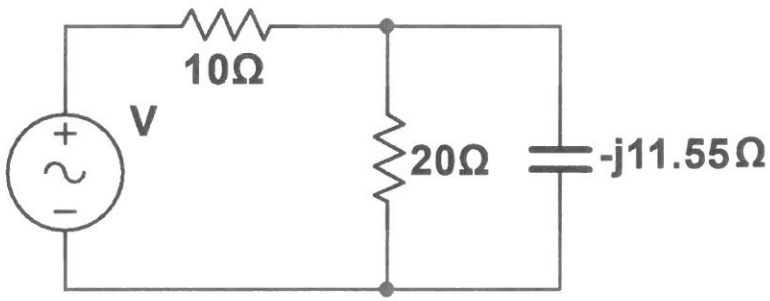

Figure 6(c)

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