UNIVERSITI TUN HUSSEIN ONN MALAYSIA

FINAL EXAMINATION
SEMESTER II
SESSION 2012/2013

COURSE NAME	:	ELECTRONICS
COURSE CODE	:	DAE 21303 / DEE 2133
PROGRAMME	:	1 DAE / 2 DEE
EXAMINATION DATE	:	MARCH 2013
DURATION	:	2½ HOURS
INSTRUCTION	:	ANSWER **FOUR (4)** QUESTIONS ONLY.

THIS QUESTION PAPER CONSISTS OF ELEVEN (11) PAGES

Q1 (a) Figure Q1(a) shows a DC power supply circuit using a capacitor filter.

(i) Sketch the output waveform with complete labeling for the given circuit configuration.

(3 marks)

(ii) Assuming that C = 1000 μF, determine the output voltage, $V_{r(p-p)}$ and average value of V_o for the full wave bridge circuit given in Figure Q1(a). The load current is 0.5 A. Use 2nd approximation model for diode with a forward voltage drop of 0.7 V.

(6 marks)

(b) Given the circuit shown in Figure Q1(b).

(i) Identify the circuit given in Figure Q1(b)

(1 mark)

(ii) Briefly explain the circuit analysis for the given circuit in Figure Q1(b)

(5 marks)

(iii) Draw the output voltage waveform if the voltage supply is 120 V.

(3 marks)

(c) Based on Figure Q1(c)(i) and Figure Q1(c)(ii) , assuming ideal diode :

(i) Briefly explain the circuit analysis for each of the given figure.

(4 marks)

(ii) Sketch the output voltage, $V_0(t)$ for each of the circuits stated above , if the input voltage ,V_i. is as given.

(3 marks)

Q2 (a) Based on the circuit configuration in Figure Q2(a) , determine the following value

(i)	Base current, I_B	(3 marks)
(ii)	Collector current. I_C	(1 mark)
(iii)	Base voltage , V_B	(2 marks)
(iv)	Collector Voltage, V_C	(2 marks)
(v)	Collector – Emitter Q point voltage, V_{CEQ}	(2 marks)
(vi)	Base- Collector voltage, V_{BC}	(2 marks)
(vii)	Saturation Current, Ic (sat)	(2 marks)
(viii)	Cut-off value of Collector-Emitter voltage , $V_{CE(\text{cut-off})}$	(2 marks)
(ix)	Draw the load line.	(2 marks)
(x)	Plot the Q point on the resulted load line.	(1 mark)

(b) By using all the data given in Figure Q2(b), determine the following values;

(i) Beta
(ii) V_{CC}
(iii) R_B

(6 marks)

Q3 The common-emitter amplifier circuit configuration is shown in Figure Q3. By referring to the figure;

(a) Draw the AC equivalent circuit by using the PIE (II) model with complete labeling. (2 marks)

(b) Calculate the following values by using the same model

(i) AC emitter resistance , r'_e (4 marks)
(ii) The input impedance of the base , z in (base) (2 marks)
(iii) The input impedance of the stage , z in(stage) (2 marks)
(iv) The AC collector resistance, rc (2 marks)
(v) The input voltage, V_{in} (2 marks)
(vi) The voltage gain, A_V (2 marks)
(vii) The output voltage across R_L, V_{out} (2 marks)

(c) Based on the circuit configuration in Figure Q3(c) ,

(i) Draw the AC equivalent circuit with complete labeling. (2 marks)
(ii) Calculate the value of r'_e (3 marks)
(iii) Determine the value of Z_{in} (2 marks)

Q4 For the self-bias common-source amplifier of Figure Q4.

(a) Solve for each of the following DC quantities:

(i) Gate voltage, V_G (2 marks)
(ii) Drain current, I_D (3 marks)
(iii) Gate-source voltage, V_{GS} (2 marks)
(iv) Drain voltage, V_D (3 marks)

(b) Solve for each of the following AC quantities:

(i) Input impedance, Z_{in} (3 marks)
(ii) Load resistance, r_L (2 marks)
(iii) Transconductance when $V_{GS} = 0$, g_{mo} (3 marks)
(iv) Transconductance, g_m (2 marks)
(v) Voltage gain, A_V (3 marks)
(vi) Output voltage, v_{out} (2 marks)

Q5 (a) List two characteristics for each of the following classes of amplifiers.

(i) Class A (2 marks)
(ii) Class B (2 marks)
(iii) Class C (2 marks)

(b) In Figure Q5(b), solve for the following:

(i) Transistor Power Dissipation (P_{DQ}) (6 marks)
(ii) Voltage gain (A_V) (3 marks)
(iii) Peak-peak output voltage (v_{out}) (2 marks)
(iv) AC load power (P_{out}) (3 marks)
(v) DC input power (P_{dc}) (3 marks)
(vi) Stage Efficiency (η) (2 marks)

Q6 (a) Explain the purpose of an oscillator and what are the conditions required for a circuit to oscillate.

(9 marks)

(b) Referring to Figure Q6(b), calculate :

(i) Frequency of oscillation. (4 marks)
(ii) Value of feedback fraction (B). (3 marks)
(iii) Minimum value of voltage gain (A_V) for the oscillator to start. (3 marks)

(c) The 555 timer of Figure Q6(c) has $R_1 = 20\ k\Omega$, $R_2 = 10\ k\Omega$, and $C = 0.047\ \mu F$.

(i) Calculate frequency of the output signal. (3 marks)
(ii) Compute the duty cycle. (3 marks)

- END OF QUESTION -

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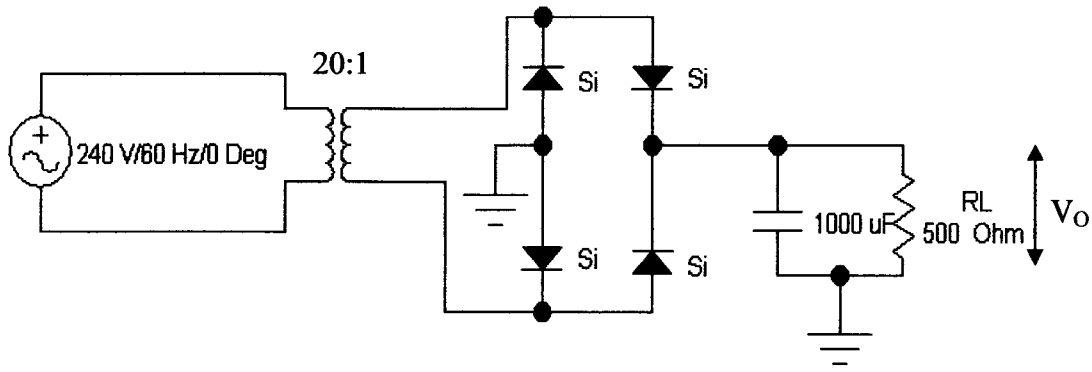

FIGURE Q1(a)

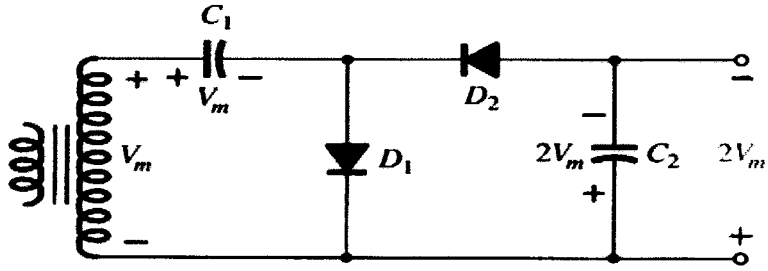

FIGURE Q1(b)

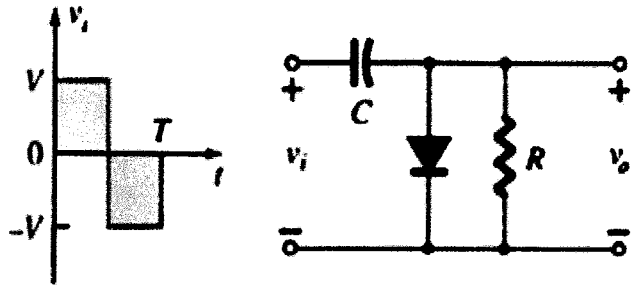

FIGURE Q1(c)(i)

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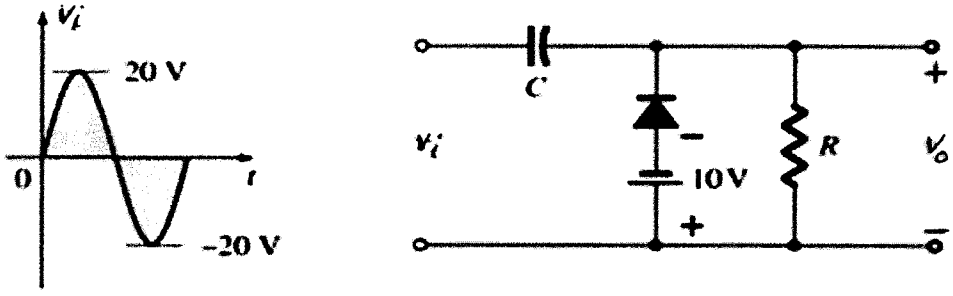

FIGURE Q1(c)(ii)

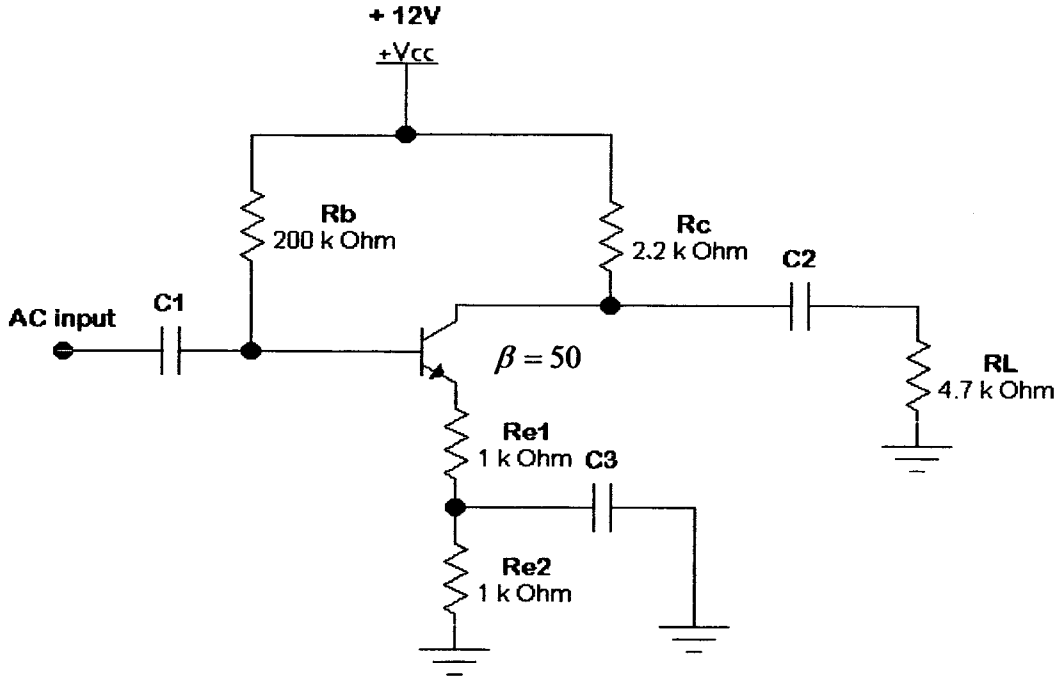

FIGURE Q2(a)

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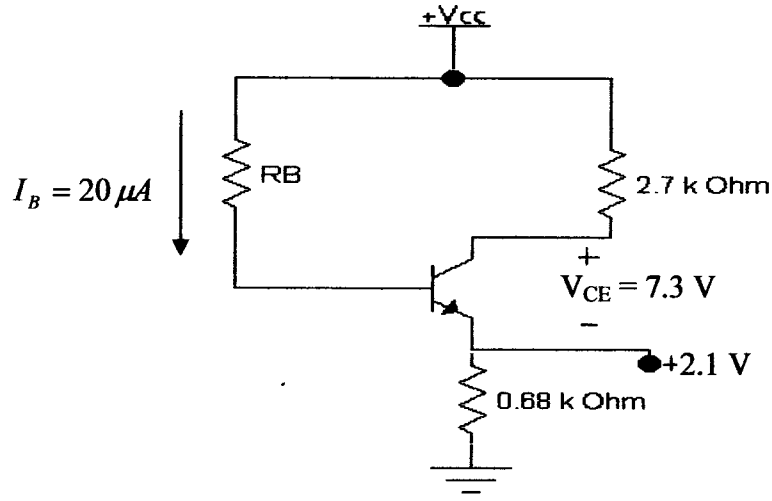

FIGURE Q2(b)

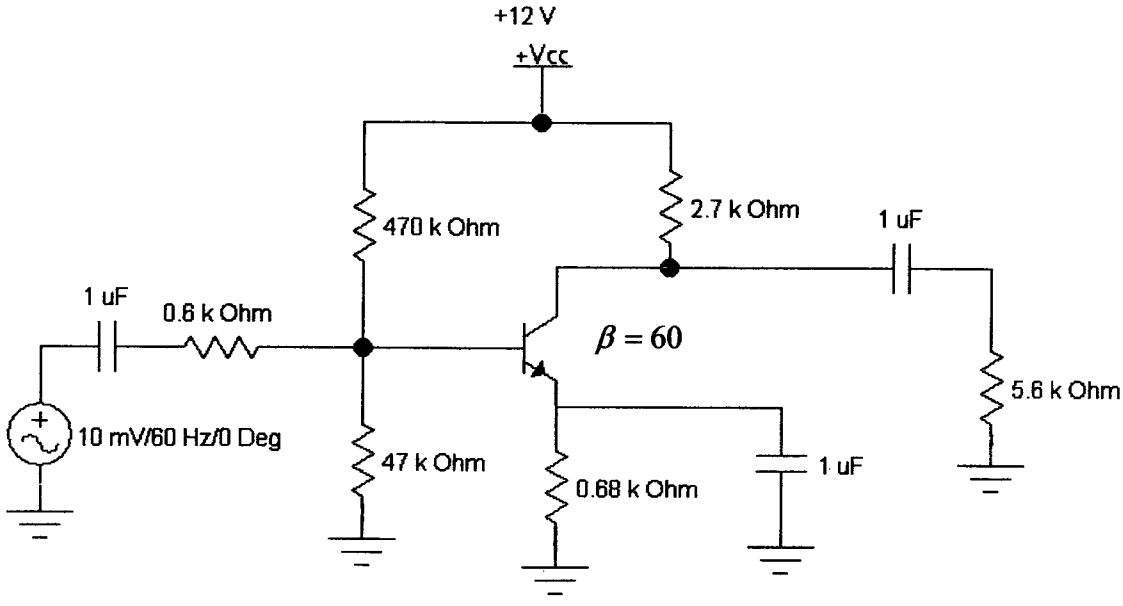

FIGURE Q3

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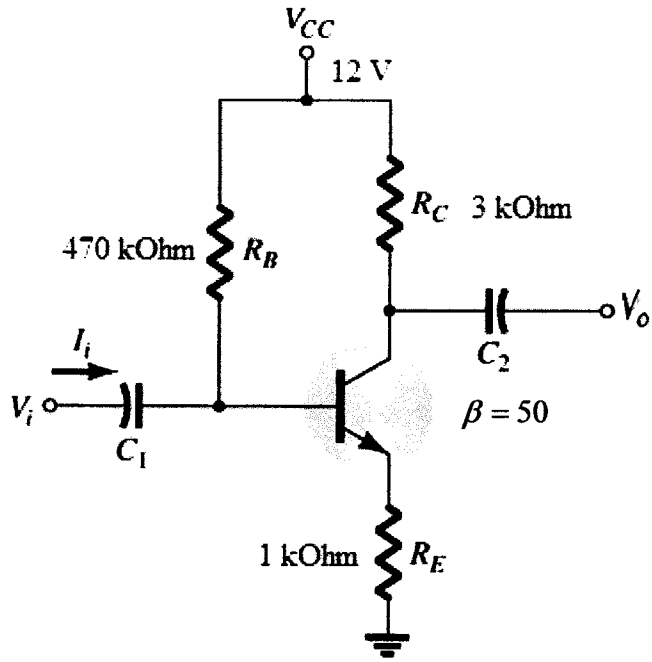

FIGURE Q3(c)

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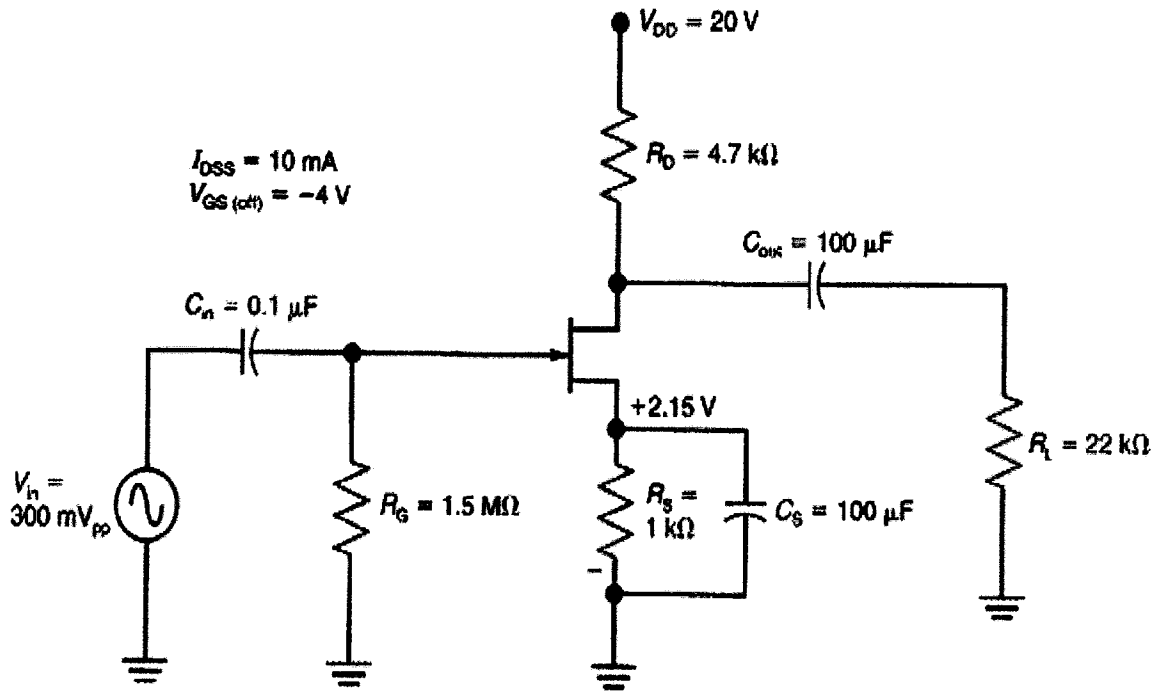

FIGURE Q4

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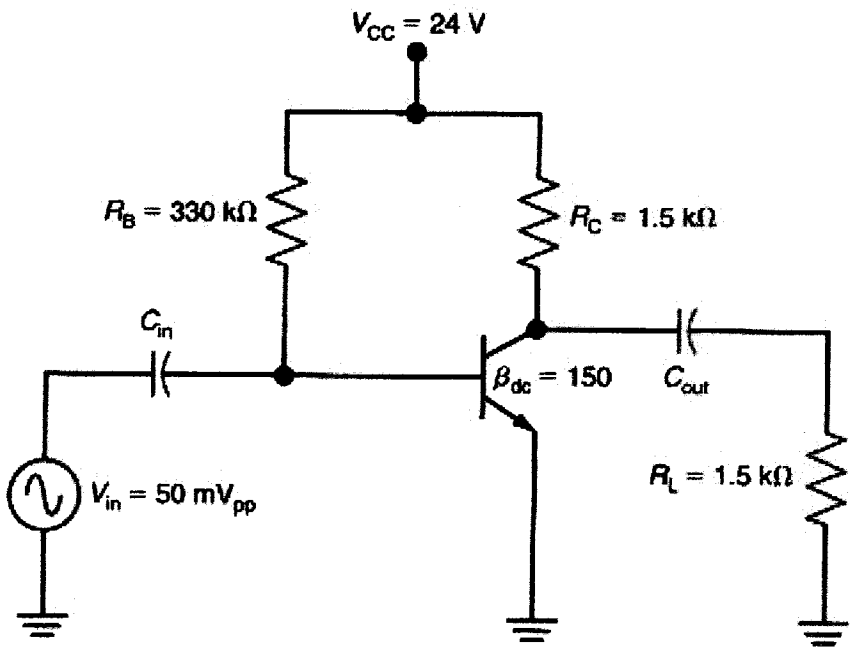

FIGURE Q5(b)

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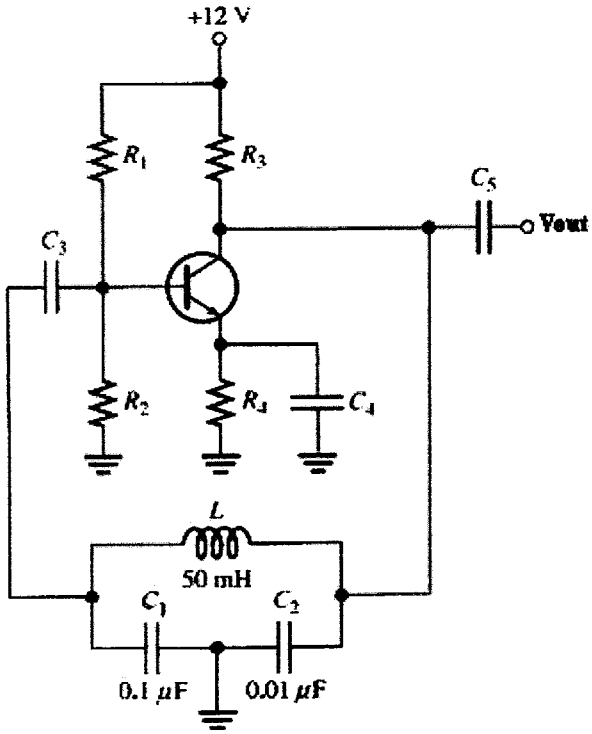

FIGURE Q6(b)

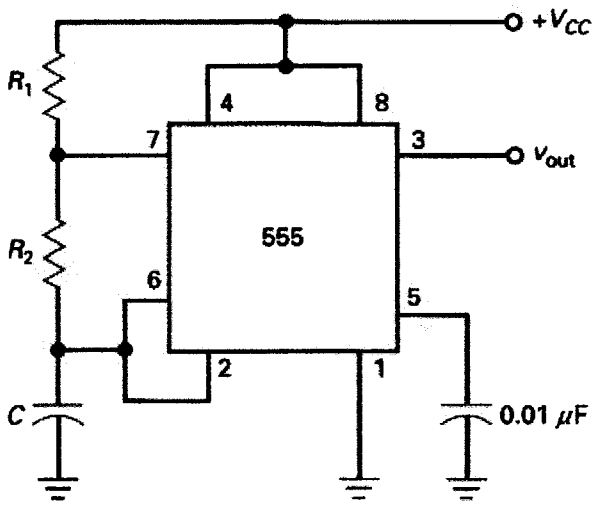

FIGURE Q6(c)