National Institute of Technology Delhi

Name of the Examination: B. Tech: Mid Semester
Examination (Spring Semester2022)

Branch : ECE   Semester : 4TH

Title of the Course : Analog Electronics   Course Code : ECB 252

Time: 1.5 Hours   MaximumMarks:25

Note: All parts of a single question must be answered together & in the same sequence as given in the question paper. **ELSE QUESTION SHALL NOT BE EVALUATED.**

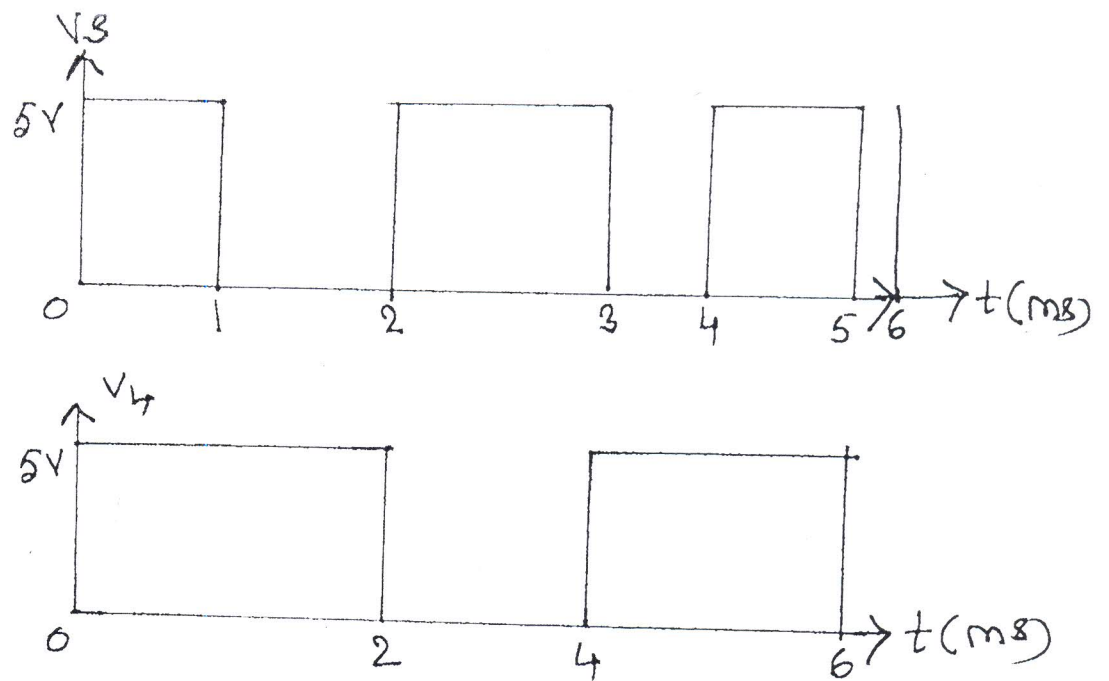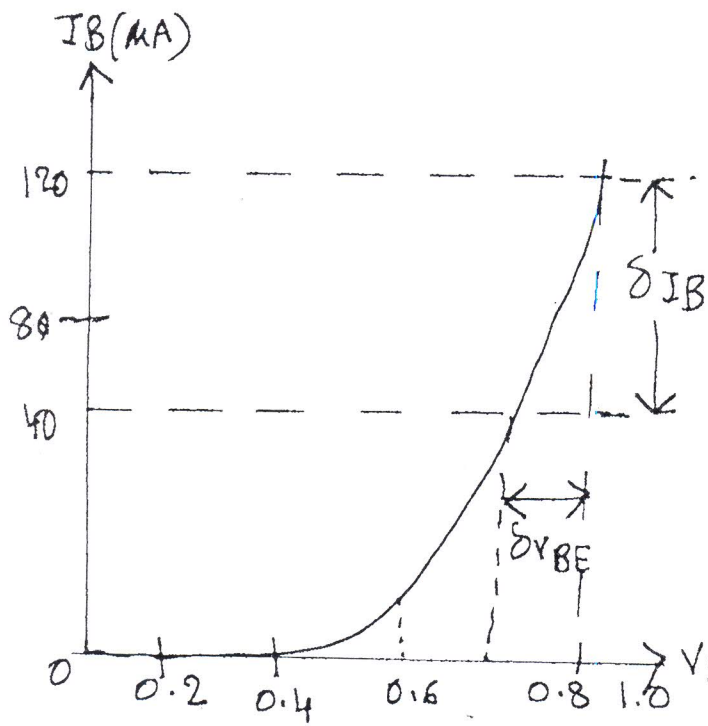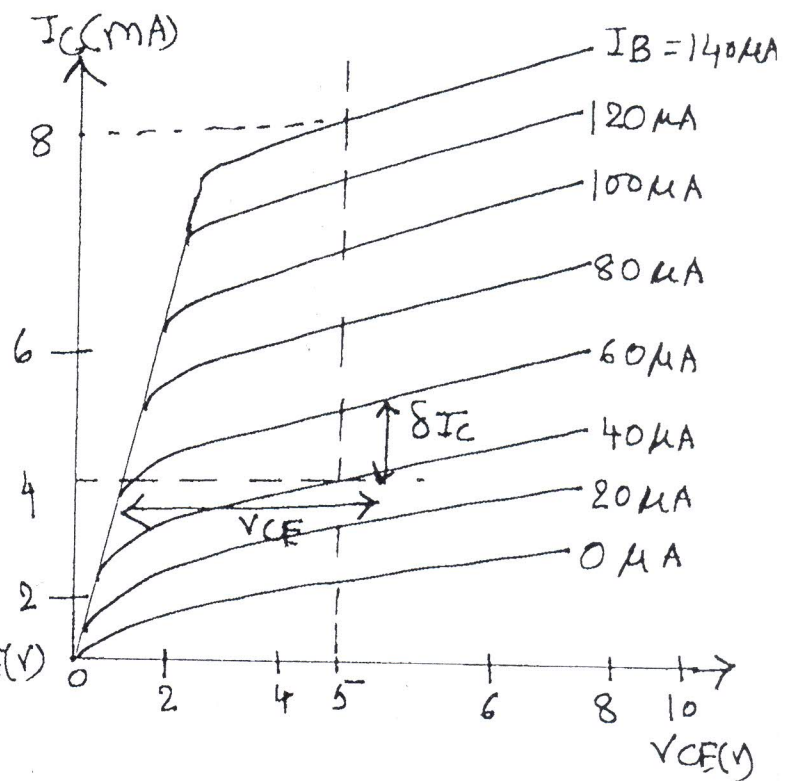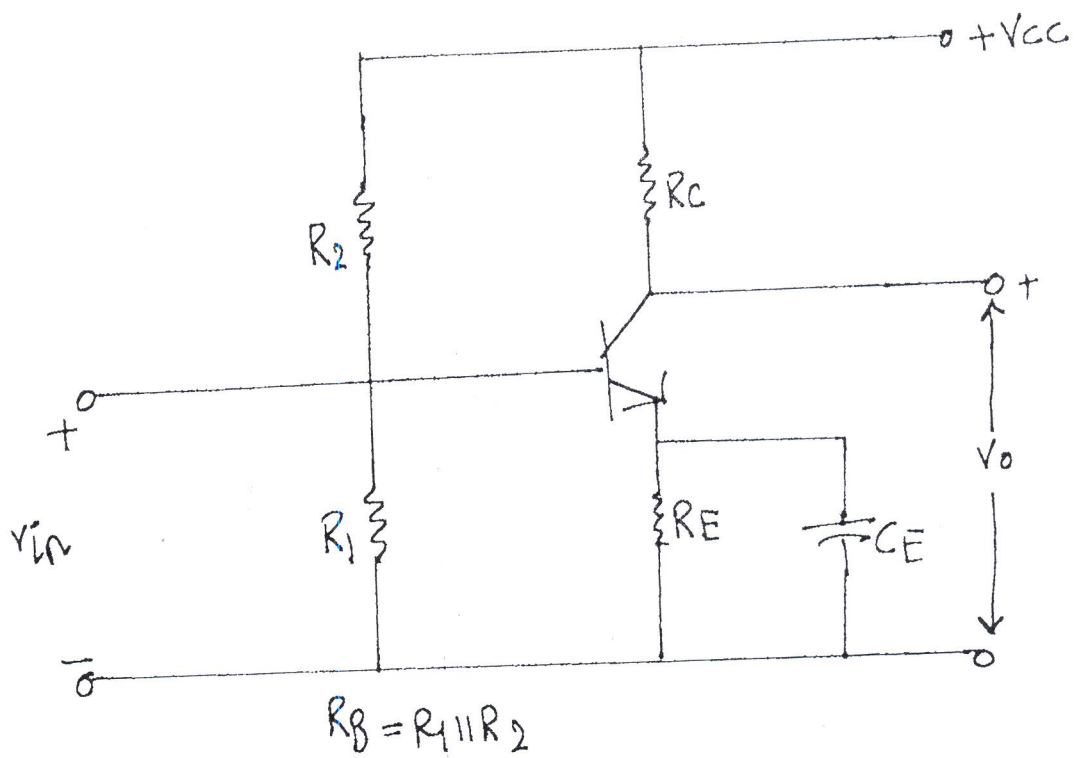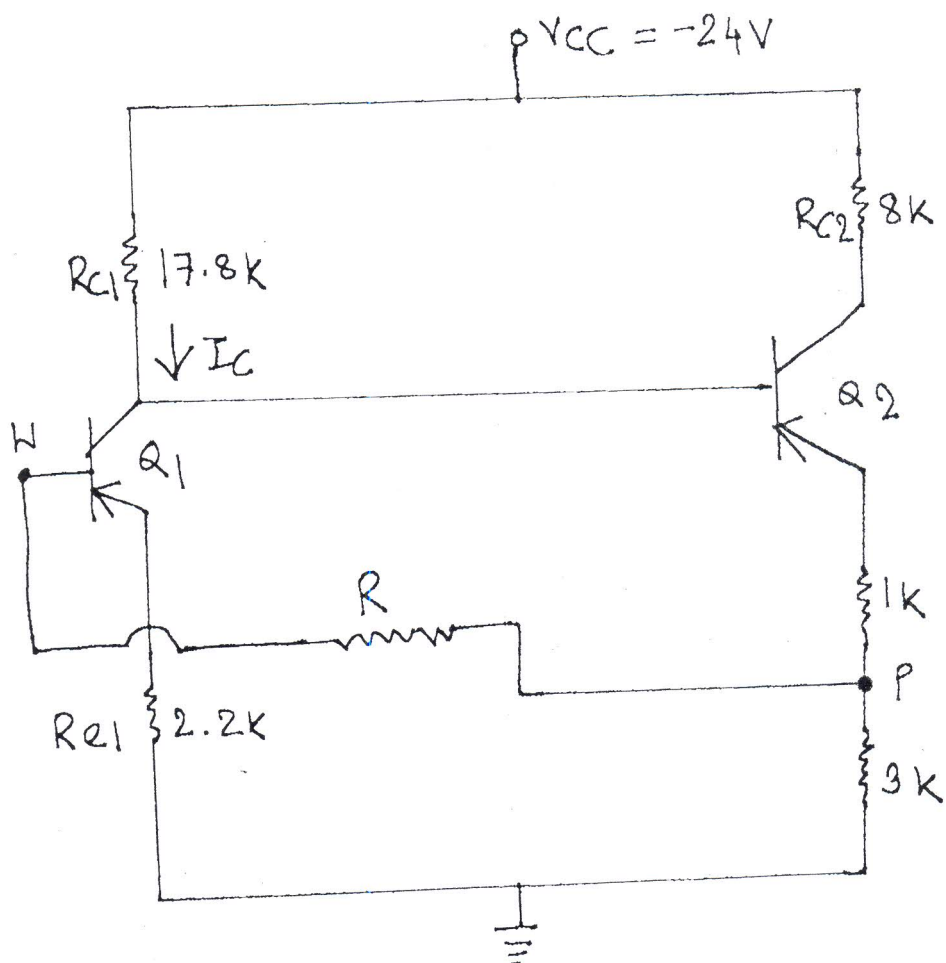|		
Q1.	Circuit in figure 1 shows a CE amplifier. β of the transistor is 165. (a) Draw the dc load line with proper labeling i.e. finds and show the values of end points of the load lines in the plot. (b) Find I_{CEQ} and V_{CEQ} i.e. Q-point values.	[2+1+4 M]
Q2.	Refer to the logic circuit and input waveforms as shown in the in figure 2 and figure 3 respectively. Find the output waveform across resistor R_3. [Assume $V_{CE(SAT)} = 0$]	[3 M]
Q3.	The input and output characteristics for a given BJT are shown in the figures 4 and 5 respectively. (a) From the characteristics find the input resistance of the BJT. (b) Find the current gain if $V_{CE} = 5V$	[3 M]
Q4.	For good stabilized biasing of the transistor of the CE amplifier, as shown in the figure 6, what should be the condition for R_E / R_B ratio?	[2 M]
Q5.	In the following two stage circuit, as shown in figure 7, assume β = 100 for each transistor. (a) Determine the value of R so that the Q-point conditions are $V_{CE1} = -4V$ and $V_{CE2} = -6V$. (b) Explain how Q-point stabilization is obtained (for $V_{BE} = 0.2V$)	[2 +1 M]
Q6.	Consider the transistor switching circuit, as shown in figure 8. (a) Let the input varies between two voltage levels as, $V_i = V_{LOW} \leq 0$ and $V_i = V_{HIGH} > V_{MIN}$, then what will be the expression for the minimum voltage required for the transistor to be operated in the saturation region under non-ideal situation? (b) If now suppose $V_i > V_{BE(SAT)}$ and $R_E = 0$ in the above circuit and we set $R_B \approx 10\ R_C$, then what region transistor will operate? What will be the outputs of the two corresponding voltage levels of input i.e. for $V_i = V_{LOW} \leq 0$ and $V_i = V_{HIGH} \geq V_{MIN}$?	[1+ 3 M]
Q7.	For the two battery transistor circuit, as shown in figure 9, determine the expression for the stability factor in terms of β, R_E, R_B only. You may neglect V_{BE}.	[3 M]
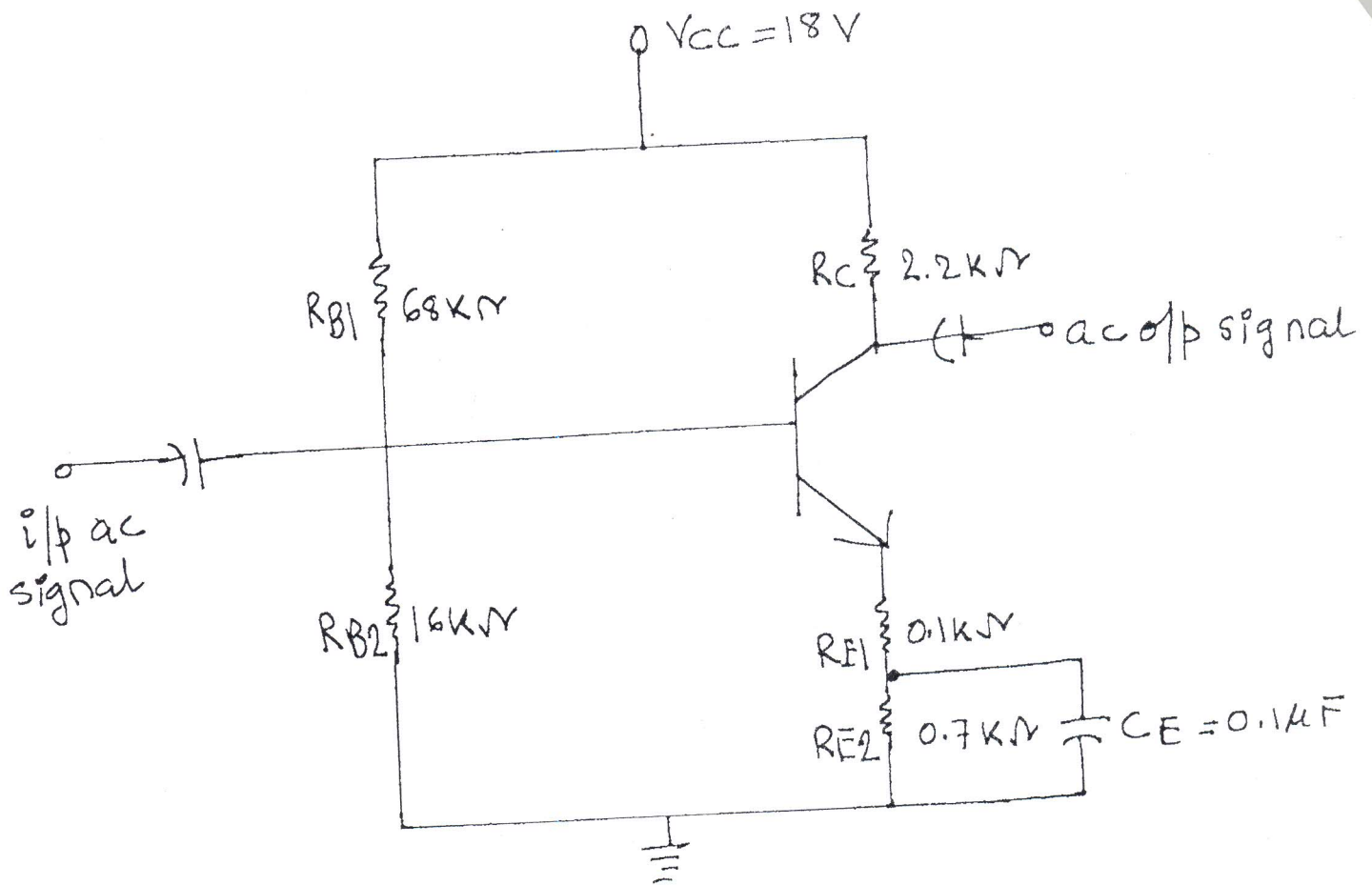
Figure ①
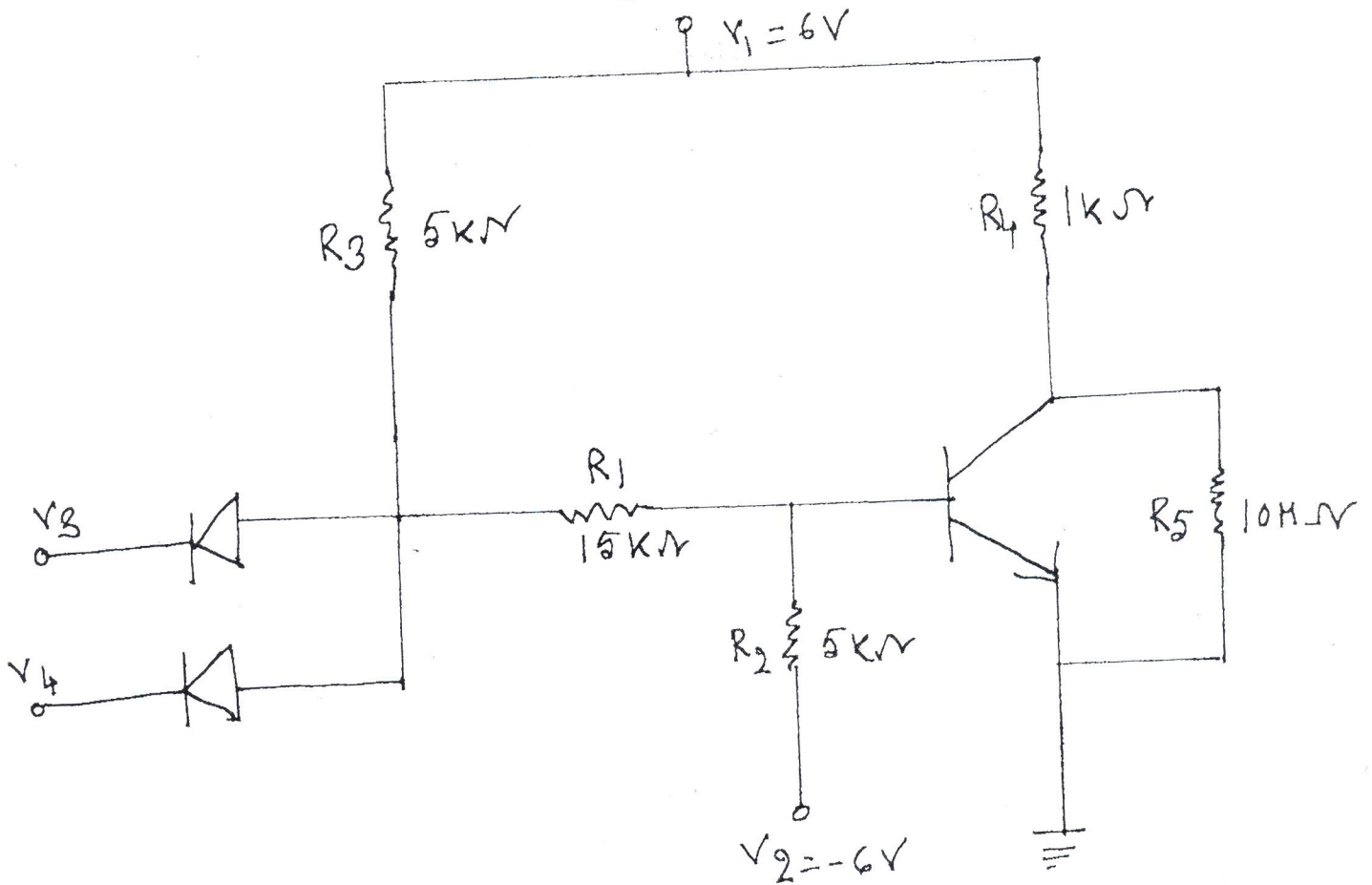
Figure ②

2

Figure ③

Figure ④

Figure ⑤

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Figure ⑥

Figure ⑦

④

Figure ⑧

Figure ⑨