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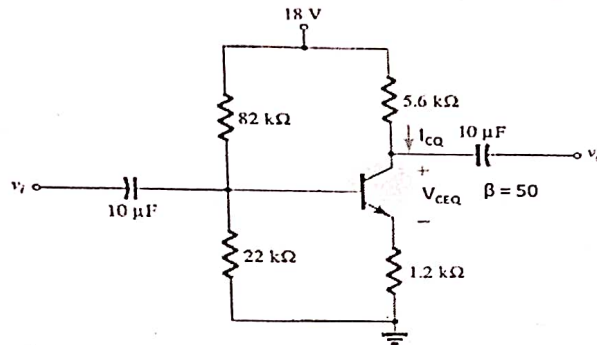
National Institute of Technology Silchar
End-semester (UG) Examination, November-2023

Subject Code: EC-101
 Semester: I
 Duration: Two Hours

Subject: Basic Electronics
 Department: CSE, ECE, EE.
 Total Marks: 50

- a. Answer any 5 (five) questions.
 b. Make appropriate assumptions where ever necessary

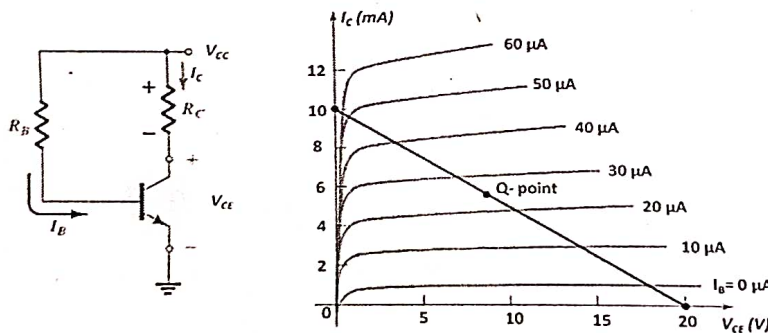
S.N.	Questions	Marks	CO
1.(a)	Explain the working of BJT in active mode and saturation mode of operation.	4	CO3
(b)	In the following circuit, Determine the values of I_{CQ} and V_{CEQ}		



6 CO3

- 2.(a) What is Early effect? How can it account for CB and CE input and output characteristics of transistor?
 (b) Determine the values of R_B , R_C , V_{CC} , I_B and I_C for given fixed biasing network following the load line and defined Q-point.

2+3 CO3

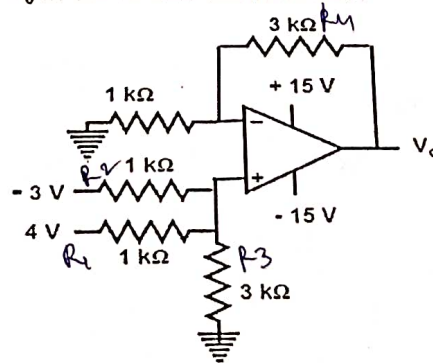


5 CO3

- 3.(a) i) What do you mean by slew rate of a circuit?
 ii) Why in ideal Op-Amp circuit, the output voltage remains constant for any value of load resistance connected at the output terminal?
 iii) What is virtual short circuit condition of Op-Amp circuit?

3 CO4

- (b) Find the output voltage V_o of the circuit shown below:

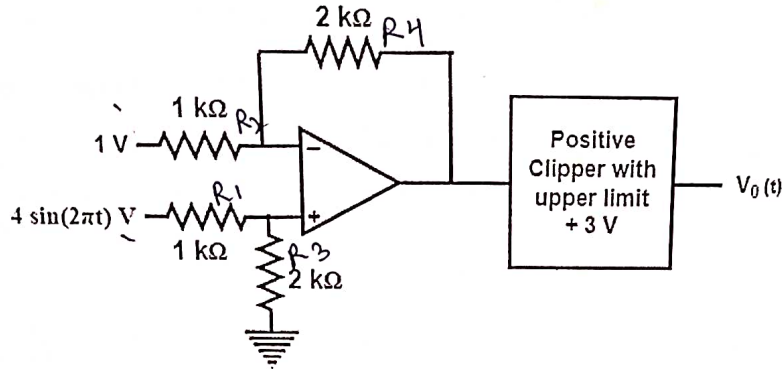


4 CO4

- (c) Design a non-inverting amplifier which produces $6 \sin(\omega t) V$ as output when an input of $2 \sin(\omega t) V$ is applied. Mind that the maximum current through the feedback resistor (in any direction) is neither more than 2 mA nor less than 1 mA .

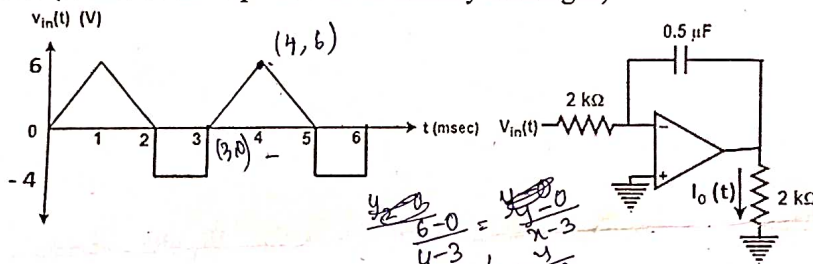
3 C04

- 4.(a) Draw the graph of output voltage $V_o(t)$ for the following circuit:



5 C04

- (b) Find the value of the current $I_o(t)$ at time $t = 4 \text{ msec}$ for the circuit shown below (Consider the capacitor to be initially uncharged):



5 C04

- 5.(a) Prove that $AB + \overline{AC} + A\overline{B}C(AB + C) = 1$

3 C05

- (b) What do you mean by "MUX"? Draw the logic diagram for an 8-input multiplexer and what will be the output of mux if we connect the select lines with logic "101"?

7 C05

6. (a) Describe the operations performed by the Full-adder arithmetic circuit.

5 C05

- (b) Reduce the expression: $AB + A\overline{B}C + \overline{A}B\overline{C} + B\overline{C}$ using K-map and implement it in AOI logic.

5 C05

B	\overline{B}	C	$\overline{B}C$	$B\overline{C}$
0	1	0	0	0
0	1	1	1	0
1	0	0	0	1
1	0	1	0	0

