


**VIT**

Vellore Institute of Technology

**Final Assessment Test – November 2025**

Course: BEEE205L - Electronic Devices and Circuits

Class NBR(s): 1210 / 1214 / 1215

Time: Three Hours

Slot: D1

Max. Marks: 100

- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

| COs | CO Statements                                                                    |
|-----|----------------------------------------------------------------------------------|
| CO1 | Solve diode circuits for various applications.                                   |
| CO2 | Analyze and design BJT and MOSFET DC circuits and their amplifier configurations |
| CO3 | Interpret frequency response of amplifiers                                       |
| CO4 | Identify the impact of negative feedback in amplifier design.                    |

BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)

 Answer ALL Questions

(10 X 10 = 100 Marks)

1. a) Draw the input waveform of the following Clipper circuit in Fig. 1 when  $V_i = 10V_{pp}$ . Find the output voltage  $V_o$  during the positive and negative half cycles of the input. Draw the output waveform. Consider  $V_r = 3V$ . [5] CO1 BL2

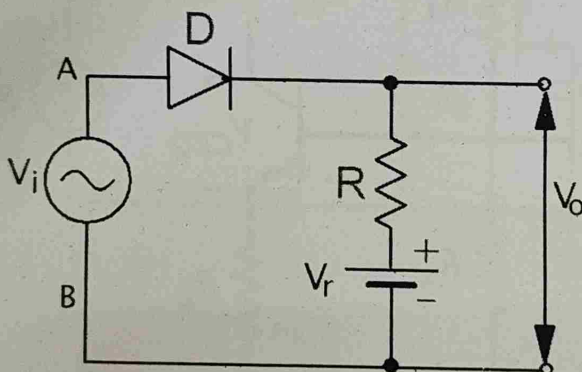


Fig. 1

- b) Design a clamper circuit to get the output waveform as shown in Fig. 2. Draw the circuit and also the input waveform. [5]

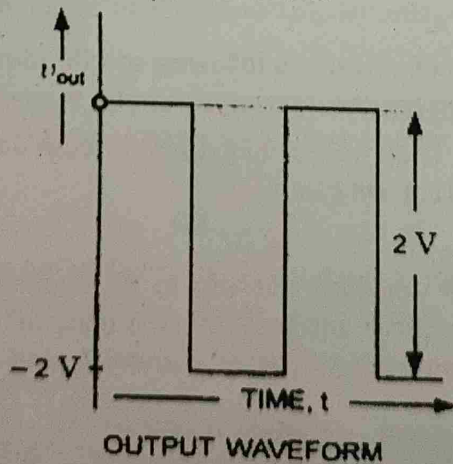


Fig. 2

CO1 BL3

2. Design a 4 diode full wave bridge Rectifier and derive its ripple factor and efficiency by defining the r.m.s and d.c voltages. Connect a reverse biased Zener diode voltage regulator to the rectifier and draw the expected input and output waveforms.

[6] CO2 BL2

3. Discuss the construction and working of a NPN BJT common base mode circuit and draw the input and output IV characteristics.

Also draw the load line for each case to find  $V_{BEQ}$  and  $I_{BQ}$  in the input characteristics and  $V_{CEQ}$  and  $I_{CQ}$  in the output characteristics. [4]

CO2 BL3

4. Analyse the circuit shown in Fig. 3 using a voltage divider bias and determine the change in the Q-point values of  $I_{BQ}$ ,  $I_{CQ}$  and  $V_{CEQ}$  when

$\beta = 50$  and 100. The circuit parameters are  $R_1 = 56k\Omega$ ,  $R_2 = 12.2k\Omega$ ,  $R_C = 2k\Omega$ ,  $R_E = 0.4k\Omega$ ,  $V_{CC} = 10V$ ,  $V_{BEon} = 0.7V$ .

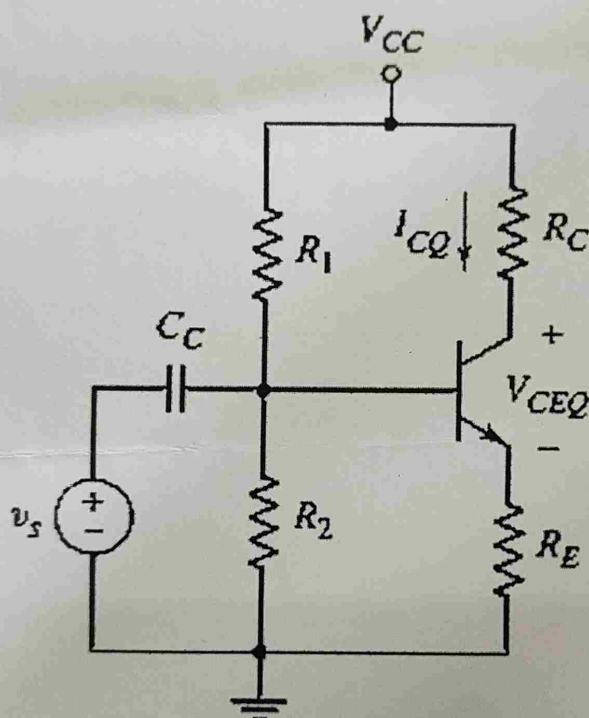


Fig. 3

CO2 BL3

5. Design a BJT R-C coupled amplifier with the following specifications:

$R_s = 1k\Omega$ ,  $C_s = 1\mu F$ ,  $R_1 = 2.2k\Omega$ ,  $R_2 = 1.2k\Omega$ ,  $R_E = 1k\Omega$ ,  $R_C = 10k\Omega$ ,  $C_C = 10\mu F$ ,  $C_L = 1\mu F$ ,  $R_L = 1k\Omega$ . Draw the circuit diagram. Consider  $\beta = 120$  and find the voltage gain and current gain.

CO2 BL2

6. Draw a BJT emitter follower amplifier and also its AC equivalent circuit. Derive the voltage gain of the circuit and show that it is unity gain. Write the expression for input and output impedances, AC currents  $I_b$  and  $I_e$ .

7. Discuss in detail the construction and working of an n-channel enhancement mode MOSFET. Draw and explain its transfer and output characteristics.

CO2 BL2

8. Draw the hybrid- $\pi$  equivalent circuit of a BJT and explain its components. How the frequency response of a BJT is influenced by these parameters? Draw the frequency response curve.

CO3 BL3

9.a) Determine the small-signal voltage gain,  $r_o$ ,  $g_m$  and input and output resistances of a common-source amplifier shown in Fig. 4. Consider:  $V_{DD} = 3.3V$ ,  $R_D = 10k\Omega$ ,  $R_1 = 140k\Omega$ ,  $R_2 = 60k\Omega$ ,  $R_{Si} = 4k\Omega$ ,  $V_{TN} = V_{GSTH} = 0.4V$ ,  $K_n = 0.5mA/V^2$ ,  $\lambda = 0.02V^{-1}$ . Draw the AC equivalent circuit.

CO2 BL3

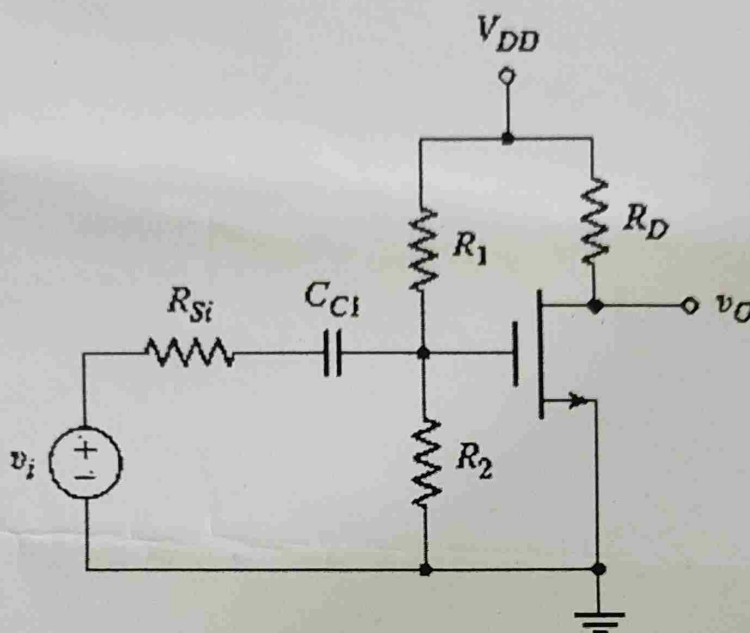


Fig. 4

OR

9.b) Consider the circuit shown in Fig. 4. Assume transistor parameters of  $V_{TN} = 0.8V$ ,  $K_n = 0.2mA/V^2$ ,  $\lambda = 0$ . Let  $V_{DD} = 5V$ ,  $R_1 = R_2 = 200k\Omega$ , and  $R_{Si} = 0$ . Design the circuit such that  $I_{DQ} = 0.5mA$  and the Q-point is in the centre of the saturation region. Find the small-signal voltage gain.

CO2 BL3

10.a) What are the advantages and disadvantages of feedback amplifiers? Discuss the working and operation of voltage series and current shunt feedback amplifiers.

CO4 BL2

OR

10.b) What is the impact of negative feedback on bandwidth and gain? Discuss the working and operation of voltage shunt and current series feedback amplifiers.

CO4 BL2

Y/K/TY