Y/K/TY

VIT
Vellore Institute of Technology

Final Assessment Test – November 2025

Course: BEEE205L - Electronic Devices and Circuits

Class NBR(s): 1210 / 1214 / 1215 Slot: D1

Time: Three Hours 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**

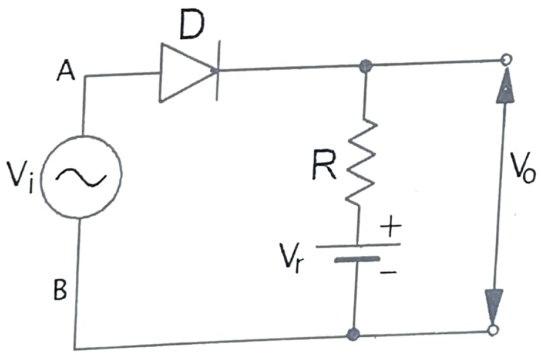
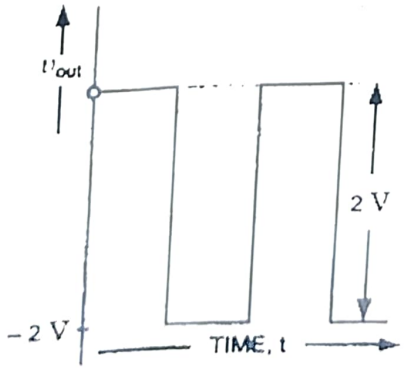


Fig. 1

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



OUTPUT WAVEFORM

Fig. 2

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. CO1 BL3

3. Discuss the construction and working of a NPN BJT common base mode circuit and draw the input and output IV characteristics. [6] CO2 BL2

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]

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 $R_1 = 56k\Omega, R_2 = 12.2k\Omega, R_C = 2k\Omega, R_E = 0.4k\Omega, V_{CC} = 10V, V_{BEon} = 0.7V$. CO2 BL3

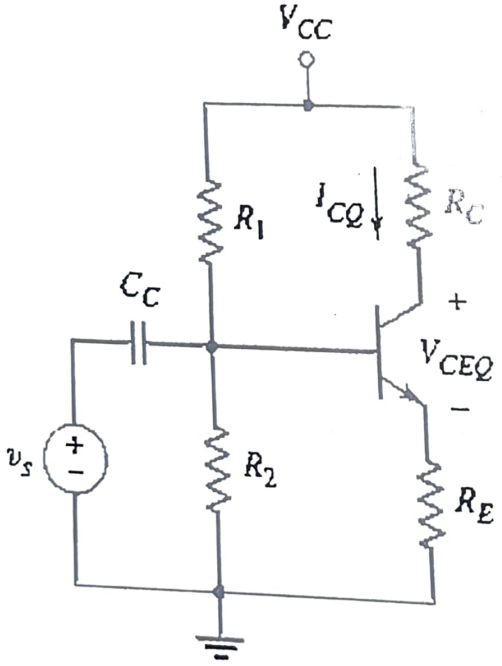


Fig. 3

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 BL3

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. CO2 BL2

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-π 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_0, 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

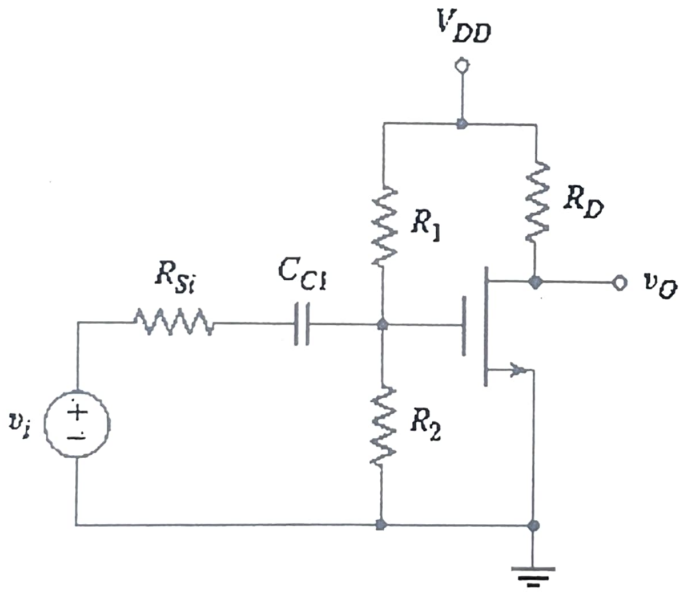


Fig. 4

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} = 5 V, $R_i = R_1 \| R_2$ = 200kΩ, and R_{Si} = 0. Design the circuit such that I_{DQ} = 0.5 mA 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 bandwith and gain? Discuss the working and operation of voltage shunt and current series feedback amplifiers.	CO4	BL2

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