VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

REG.NO.:

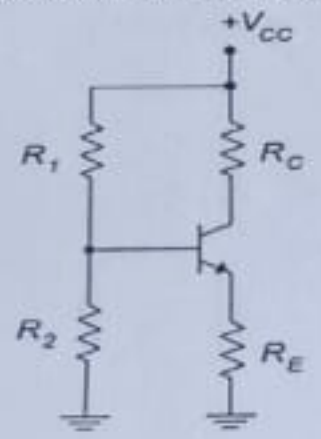
SCHOOL OF ELECTRONICS ENGINEERING
CONTINUOUS ASSESSMENT TEST - I
FALL SEMESTER 2025-2026

SLOT:D2+TD2

Programme Name & Branch :B.Tech, ECE
Course Code and Course Name : Analog Circuits-BECE 206L
Faculty Name(s) : Dr. M. Jasmin Pemeena Priyadarisini, Dr. Deepika Rani Sona, Dr. P. Sathyanarayanan, Dr. Gautam Narayan, Dr. Veerapu Goutham, Dr. Sandhana Mahalingam M
Class Number(s) : VL2025260100478, VL2025260103560, VL2025260100474, VL2025260102659, VL2025260102656, VL202526010266
Date of Examination :20.08.2025
Exam Duration : 90 minutes Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  1. Design the BJT and MOSFET amplifier circuits using suitable biasing techniques and analyze their frequency response characteristics.
  2. Distinguish among different classes of MOSFET power amplifiers and employ them for various applications.

Q. No	Question	M	CO	BL
1.	Determine I_c and V_{CE} for the network shown in the Fig.1. Assume $\beta = 100$, $V_{BE} = 0.7$ V, $V_{CC} = 12$ V, $R_1 = 20$ kΩ, $R_2 = 4.7$ kΩ, $R_C = 2$kΩ and $R_E = 470\Omega$. Plot the load line and locate the Q point parameters for the circuit.  Fig.1	10	1	3
2.	*(i). Calculate the midband gain A_M of a CS amplifier with a signal source having an internal resistance R_{sig} = 105 kΩ. The amplifier has R_G= 2MΩ , $R_D = R_L$ =10 KΩ, g_m=2 mA/V, r_0 = 100 kΩ, C_{gs} = 2pF and C_{gd} = 1 pF. (ii). For the same CS amplifier specified, find the values of A_M that result when the signal source resistance is reduced to 50kΩ.*	10	1	3
3.	Consider the single-stage common-emitter amplifier shown in the Fig. 2, where V_{cc} = 15V, R_{sig}= 10 kΩ, r_x= 50Ω, R_1 = 68 kΩ, R_2 = 27 kΩ, R_E = 2.2 kΩ, R_C= 4.7 kΩ, R_L = 10 kΩ and β = 200. The collector current is 0.8 mA, f_T= 800 MHz, early	10	1	3

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voltage V_A = 100V and C_μ = 0.8 pF. Construct small-signal high-frequency hybrid-π equivalent model of the CE amplifier and also compute the upper 3-dB cutoff frequency.

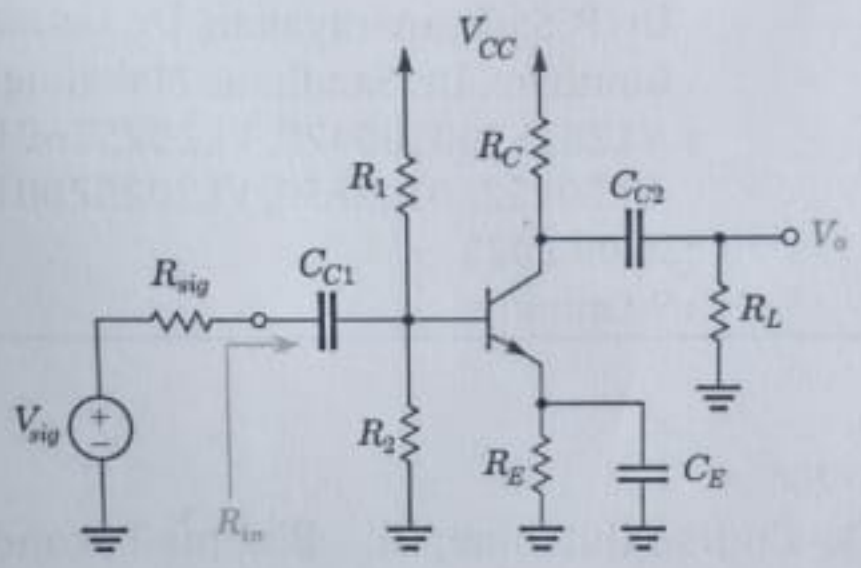

Fig.2

	Explain how the Miller effect impacts the high frequency response of a single stage NMOS CS amplifier. For a given $C_{gd} = 1.2pF$, $C_{gs} = 3.5pF$, $R_G = 0.5M\Omega$, $R_D = 12k\Omega$, and AM=−20, Calculate f_H .	10	1
5.	a) Consider the Class A output stage using common source circuit shown in Fig.3. Derive power conversion efficiency of the given class-A amplifier. b) Consider the common source circuit shown below. The Q point is located at V_{DSQ} = 6 V. (i) Find the quiescent current (I_{DQ}), (ii) Determine the maximum peak to peak amplitude of the sinusoidal output voltage if the V_{DS} max = 10 V, and (iii) Calculate the power conversion efficiency.	10	2

$V_{DD} = 12V$
$R_D = 100\Omega$
$V_{DS_{(min)}} = -10V$

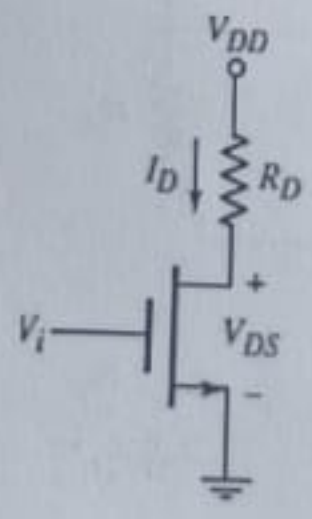

Fig.3