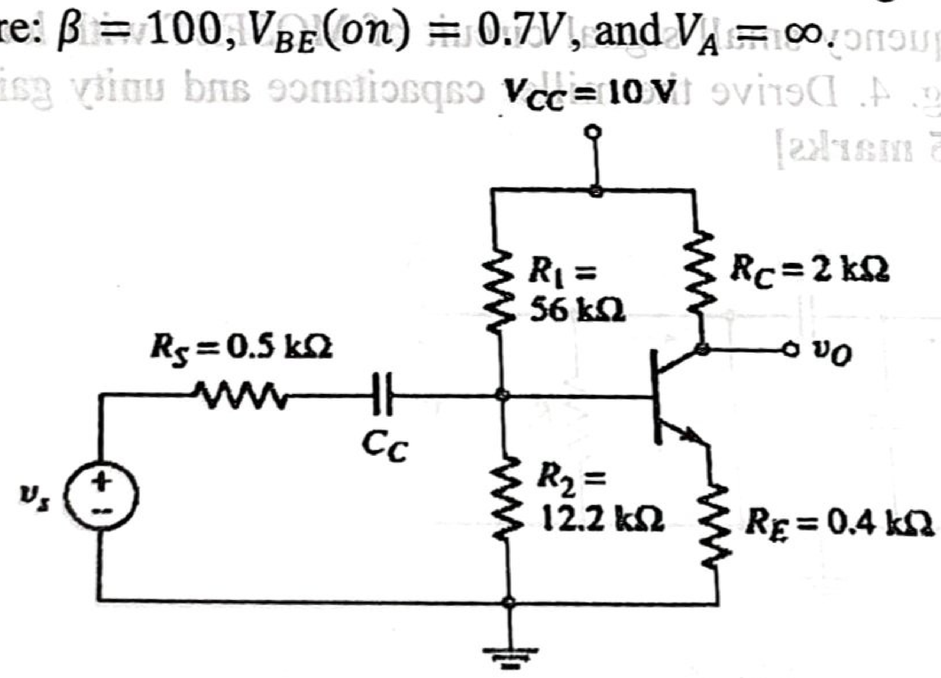
Continuous Assessment Test (CAT) – I AUGUST 2025

ramme	:	B. Tech (ECE)	Semester	:	FS 2025-26
rse Code urse Title	:	BECE206L Analog Circuits	Class Number	:	CH2025260100360 CH2025260100361 CH2025260100362 CH2025260100363
aculty	:	Dr. Manikandan P Dr. Sangeetha RG Dr. Sathyasree J Dr. Kalaivanan K	Slot	:	E1+TE1
Duration	:	90 Minutes	Max. Mark	:	50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks	CO	BT Level
1		Determine the small-signal voltage gain and input resistance of a common-emitter circuit with an emitter resistor. For the circuit in Fig. 1, the transistor parameters are: $\beta = 100, V_{BE}(on) = 0.7V$, and $V_A = \infty$.  Fig. 1	10	1	L3
2		Consider the circuit shown in Fig. 2. (i) Determine the power consumed by the circuit. (ii) Calculate the mid-frequency voltage gain. (iii) Estimate the lower cut-off frequency using either the Short Circuit Time Constant (SCTC) or dominant pole approach. (iv) Calculate the upper cut-off frequency using either the Open Circuit Time Constant (OCTC) or Miller approach. Assume $R_1 = R_2 = 100k\Omega$, $R_L = R_D = 10k\Omega$, $R_S = 1k\Omega$, $C_{C1} = C_{C2} = 10\mu F, g_m = 10mS$ **[2+3+3+2 marks]**	10	1	L3

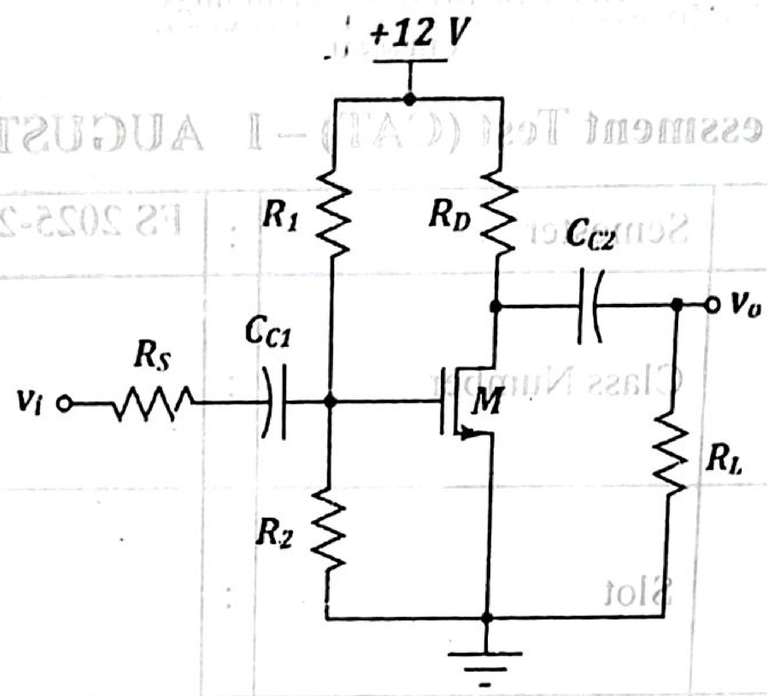


Fig. 2

			15	1	
		(a) Consider the high frequency small signal equivalent model of common source amplifier shown in Fig. 3. Derive the short circuit current gain and unity gain frequency for the circuit. **[5 marks]**			

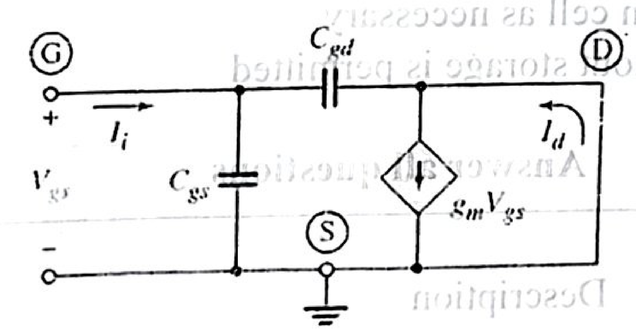


Fig. 3

3		(b) Consider the high frequency small signal circuit of MOSFET with load resistance R_L shown in Fig. 4. Derive the miller capacitance and unity gain frequency for the circuit. **[5 marks]**			L3

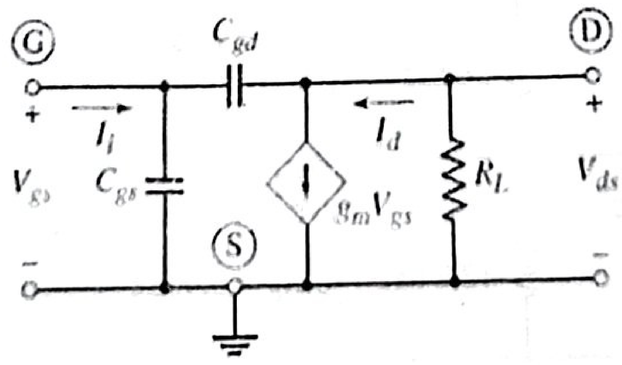


Fig. 4

		(c) Consider $K_n = 0.25\,mA/V^2$, $V_{TN} = 1V$, $\lambda = 0$, $C_{gd} = 0.04pF$, $C_{gs} = 0.2pF$, $g_m = 1mA/V$, $R_L = 10k\Omega$. Calculate and compare the unity gain frequency from part (a) and part (b). **[5 marks]**			
4		(a) Explain the working principle of a Class B power amplifier with a neat circuit diagram. Also derive the expression for finding the power conversion efficiency. Discuss how crossover distortion occurs in such amplifiers. **[10**	15	2	L2

marks]

(b) For a push–pull Class B amplifier powered by $V_{DD} = \pm 15V$ supply and driving an 8 Ω load. The output voltage is $V_o = 8 \sin \omega t$, calculate:

(i) Average drain current

(ii) Average power delivered to load

(iii) Average power supplied by sources

(iv) Maximum power conversion efficiency

[5 marks]

**********All the best **********