VIT
Vellore Institute of Technology

Continuous Assessment Test – I

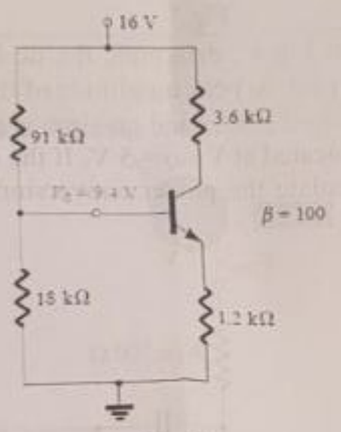
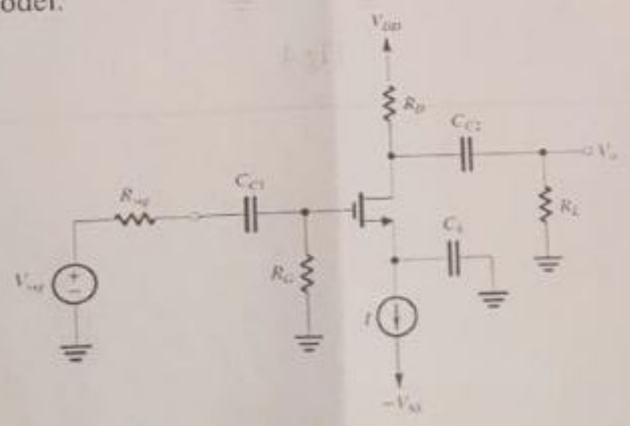
Programme Name & Branch: B.Tech, ECE

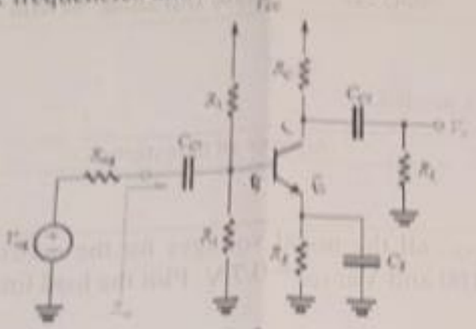
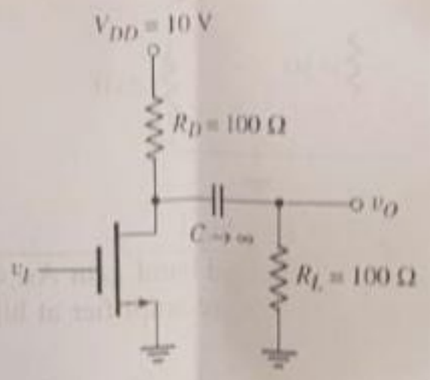
Course Name & Code: Analog Circuits-BECE 206L

Semester: Fall-2023-24 **Slot:** G2 **Exam Duration:** 90 Min **Maximum Marks:** 50

General instruction(s):

Assume constants whenever it is needed

Answer all Questions				
S.No.	**Question**	**Marks**	**CO**	**BL**
1.	Determine I_{CQ}, V_{CEQ}, all the nodal voltages for the network shown in Fig.1. Assume $\beta = 100$ and $V_{BE(on)} = 0.7$ V. Plot the load line and Q point for the circuit.  Fig.1	10	1	L3
2.	Derive the expressions for the mid band gain A_M and the upper 3-dB frequency f_H of the common source amplifier at high frequency using hybrid π model.  Fig.2	10	1	L3

3.	In a MOSFET amplifier, R_{sig} = 100 KΩ, R_G = 100 KΩ, C_{gs} = 1 pF, C_{gd} = 0.2 pF, g_m = 3 mA/V, r_o = 50 KΩ, R_D = 8 KΩ, and R_L = 10 KΩ. Determine the expected 3-dB cutoff frequency f_H and the midband gain. If it is possible to replace the MOSFET with another having the same C_{gs} but a smaller C_{gd}, what is the maximum value that its C_{gd} can be in order to obtain an f_H of atleast 1 MHz.	10	1	L3
4.	Consider the CE amplifier under the following conditions: V_{CC} = 5V, Rsig = 5 kΩ, R_1 = 33 kΩ, R_2 = 22 kΩ, R_E = 3.9 kΩ, R_C = 4.7 kΩ, R_L = 5.6 kΩ and β = 120. The dc emitter current can be shown to be I_E = 0.3 mA. Find the mid band gain. If C_{C1} = C_{C2} = 1 μF and C_E = 20 μF, find the three break frequencies and an estimate for f_L.  Fig.3	10	1	L3
5.	For the circuit shown in Fig:4 , determine the dc load line, quiescent current (I_{DQ}), maximum peak to peak amplitude of the sinusoidal output voltage , input power, output power and maximum efficiency if V_{DSmin} = 1.5 V .The Q point is located at V_{DSQ} = 5 V. If the quiescent current is changed to 40 mA, calculate the power conversion efficiency for the same V_{DSmin}.  Fig.4	10	2	L3