Name:

Enrolment No:

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

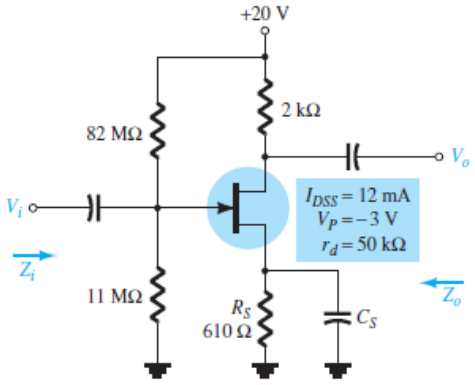
Course: Analog Electronics-I **Semester: III**
Program: B. Tech (ECE) **Time: 03 hrs.**
Course Code: ECEG2011 **Max. Marks: 100**

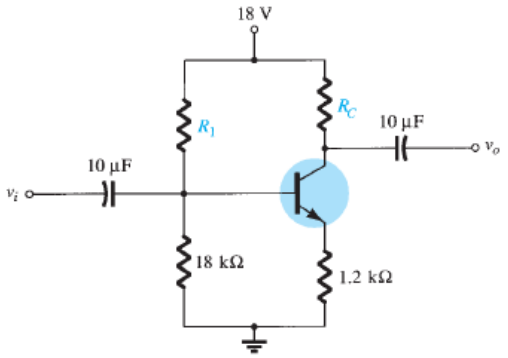
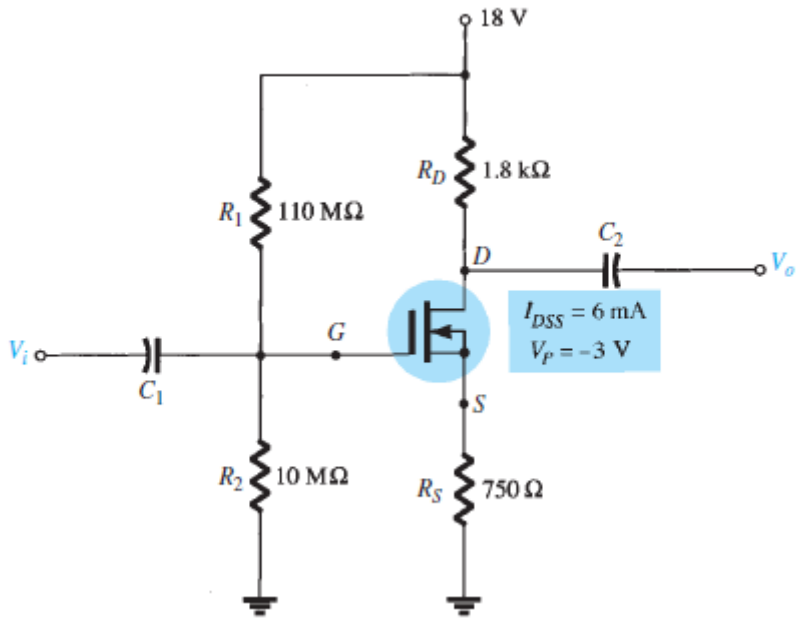
Instructions: The QP is 3 pages long. Draw the neat and clean diagram wherever it is needed.

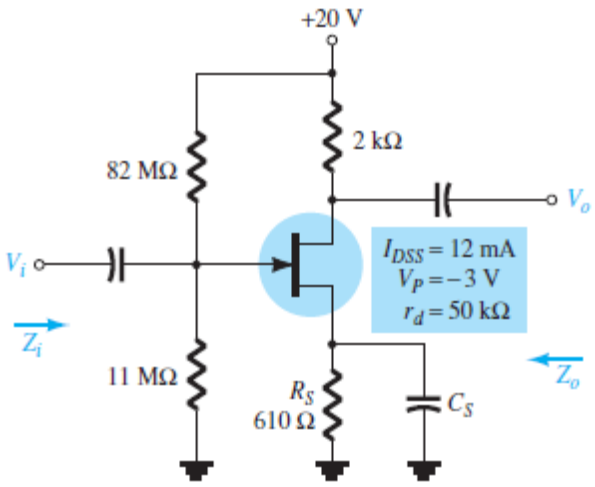
SECTION A

S. No.		Marks	CO
Q 1	Given that β_{dc} = 120 and I_C = 2.0 mA, find I_E and I_B.	**4**	**CO1**
Q 2	State Miller's theorem with the aid of a circuit diagram. Write the importance of this theorem in circuit analysis.	**4**	**CO1**
Q 3	Calculate the power gain in decibels for each of the following cases. (a) P_o = 100 W, P_i = 5 W. (b) P_o = 100 mW, P_i = 5 mW.	**4**	**CO3**
Q 4	For a typical BJT (h_{ie} = 2.4 k, h_{fe} = 100, h_{re} = 4 x 10^{-4}, and h_{oe} = 25 µS), sketch the following: **a.** Common-emitter hybrid equivalent model. **b.** Common-emitter r_e equivalent model.	**4**	**CO1**
Q 5	A n-channel JFET has device parameters of I_{DSS} = 8 mA and V_P = 4 V. Sketch the transfer characteristics.	**4**	**CO2**

SECTION B

Q 6	Determine Z_i, Z_o, and V_o for the network of the following figure if V_i = 20 mV. 	**10**	**CO2**

Q 7	Three identical cascaded stages have an overall upper 3-db frequency of 20kHz and a lower 3-dB frequency of 20Hz. What are f_L and f_H of each stage? Assume non-interacting stages.	**10**	**CO4**
Q 8	(a) Compare Field Effect Transistors' (FET) advantages and disadvantages to those of BJTs. (b) Draw the basic construction of a depletion-type MOSFET. What is the effect of V_{GS} on channel width?	**5+5**	**CO2**
Q 9	Given that I_{CQ} = 2 mA and V_{CEQ} = 10 V determine R_1 and R_C for the network of following figure 	**10**	**CO1**
	SECTION-C		
Q 10	(a) What is the significant difference between the construction of an enhancement type MOSFET and a depletion type MOSFET. (b) For the n-channel depletion-type MOSFET of below figure, determine: (i) I_{DQ} and V_{GSQ} (ii) V_{DS}. 	**5+15**	**CO2**
Q 11	Determine Z_i, Z_o, and V_o for the network of following figure if V_i = 20 mV.	**20**	**CO3**



OR

For the Darlington network of the following figure:
(a) Determine the dc levels of V_{B1}, V_{C1}, V_{E2}, V_{CB1}, and V_{CE2}.
(b) Find the currents I_{B1}, I_{B2}, and I_{E2}.
(c) Calculate Z_i and Z_o.
(d) Determine the voltage gain $A_v = V_o / V_i$ and current gain $A_i = I_o / I_i$.