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## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, Dec 2019

Programme Name: B.Tech ECE

Semester: III

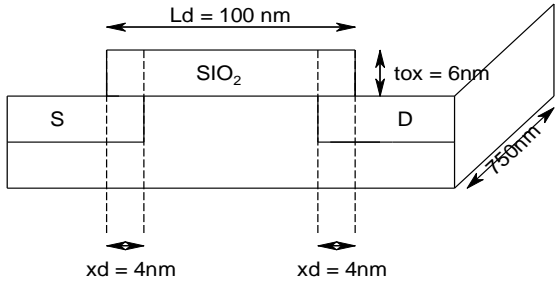
Course Name: Analog Electronics I.

Time: 03 hrs

Course Code: ECEG 2011

Max. Marks: 100

Nos. of page(s): 2

S. No.	SECTION A : : Attempt all the questions	Marks	COs
Q 1	Explain why it is important to set the Q point at the middle of the DC load line. Draw the proper DC load line on output characteristics for common emitter configuration?	7	CO2
Q 2	Describe the thermal run away condition in BJTs and how it affects the operating point of an amplifier.	8	CO2
Q 3	Draw the equivalent hybrid model for N- channel JFET and mention all the h model parameters.	7	CO2 CO1
Q4	<p>Compute the Gate capacitance <math>C_G</math>, gate to drain capacitance <math>C_{GD}</math>, gate to source capacitance for the Fig. 1. Consider the overlapping capacitances <math>C_{GSO} = C_{GDO} = 5 \text{ fF/m}^2</math>. What will be effects on these capacitances when horizontal dimension are scaled by 1/4 and vertical dimensions by 1/3.</p> <div style="text-align: center;">  <p style="text-align: center;">Fig. 1</p> </div>	8	CO2 CO1
<b>SECTION B : Attempt all the questions</b>			
Q 5	<p>The fixed-bias common source configuration having an operating point defined by <math>V_{GSQ} = 2 \text{ V}</math> and <math>I_{DQ} = 5.625 \text{ mA}</math>, with <math>I_{DSS} = 10 \text{ mA}</math> and <math>V_{GS_{OFF}} = -8 \text{ V}</math>. The network configuration is shown in Fig. 2 with an applied input signal <math>V_i</math>. The value of <math>Y_o</math> is provided as <math>50 \mu\text{S}</math>.</p> <p>(a) Determine <math>g_m</math>.            (b) Find <math>r_d</math>.            (c) Determine <math>Z_i</math>.            (d) Calculate <math>Z_o</math>.            (e) Determine the voltage gain <math>A_v</math>.</p>	15	CO1 CO2

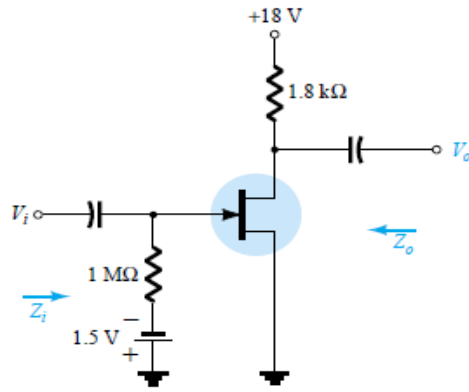


Fig. 2

- Q6 (a) Determine the operating point of the given amplifier as shown in Fig 3 under DC analysis? Evaluate the following performance parameters of the given CE amplifier below  
 (b) Find  $Z_i$  and  $Z_o$ .  
 (c) Calculate  $A_v$  and  $A_i$ .

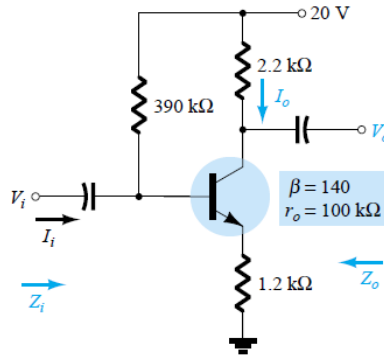


Fig. 3

- Q7 (a) Analyze the Characteristics of Enhancement type and Depletion type MOSFET?  
 (b) Draw the transfer and output characteristics of N- channel JFET and elaborate on the input impedance of the JFET ?

**SECTION-C : Attempt question given below.**

- Q8 Consider the BJT amplifier shown below (Fig. 4) and determine the followings:  
 (a) Calculate  $Z_i$  and  $Z_o$ .  
 (b) Find Over all  $A_v$  and  $A_i$ .  
 (c) Calculate the output for  $V_i = 250m.Sin2\pi 100t$ .

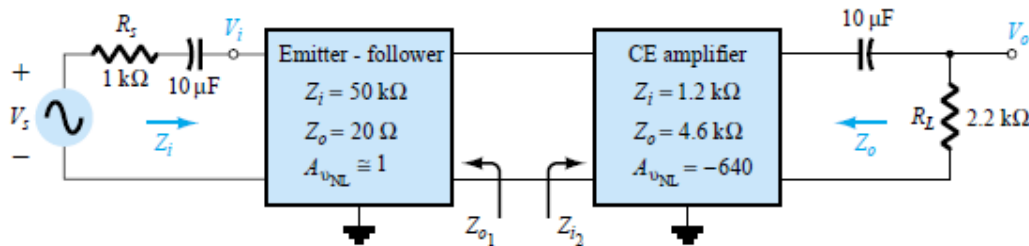


Fig. 4