U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

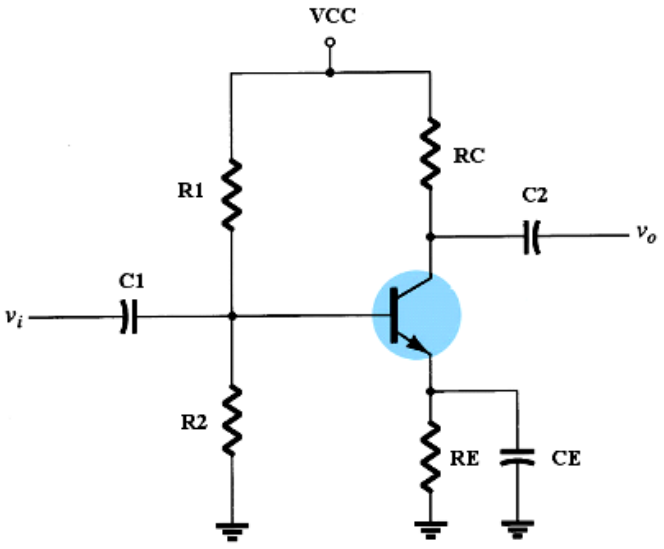
Autonomous Institute Affiliated to VTU

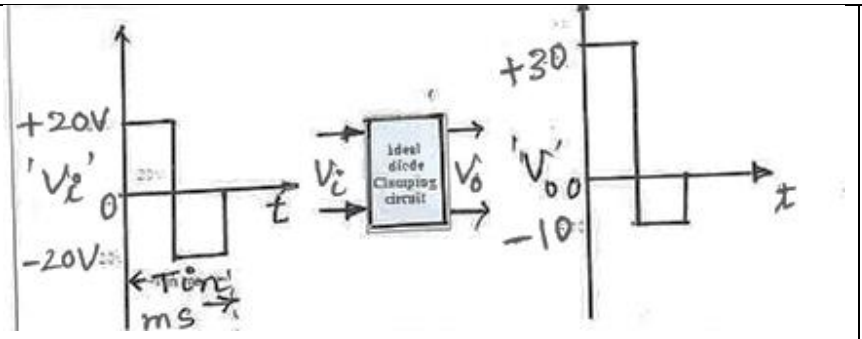
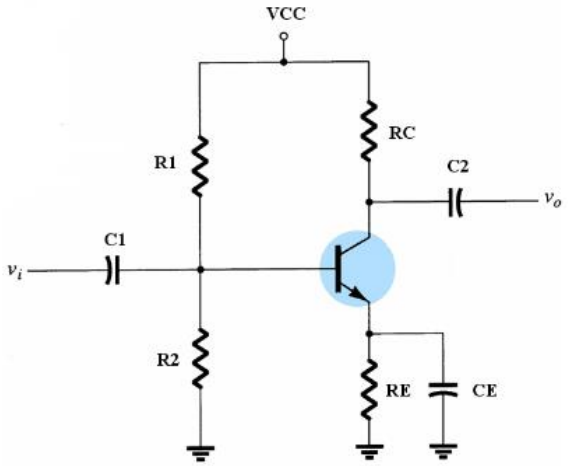
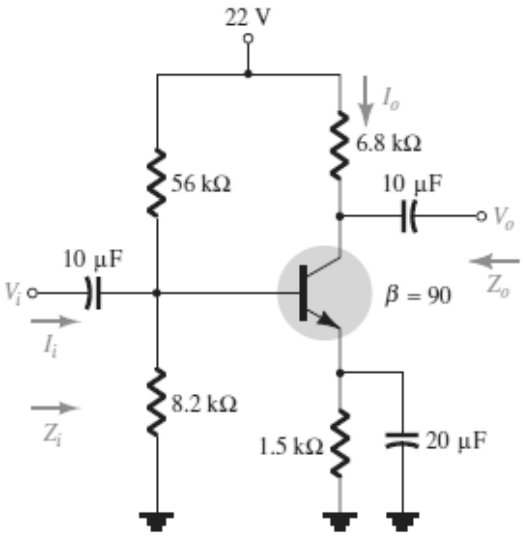
June / July 2024 Semester End Make-Up Examinations

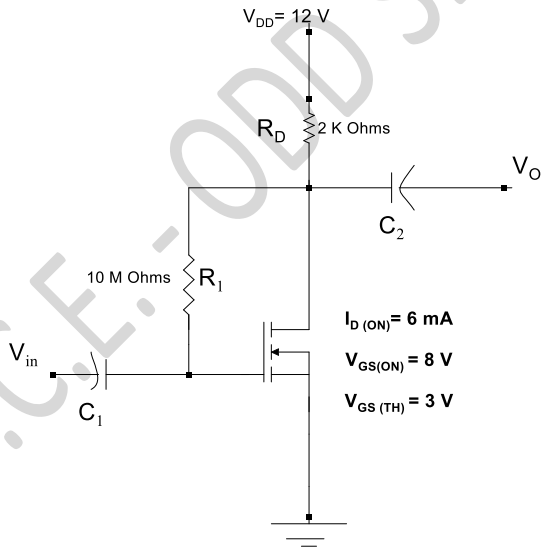
Programme: B.E. **Semester: III**
Branch: MD/EIE **Duration: 3 hrs.**
Course Code: 23ES3PCAME **Max Marks: 100**
Course: Analog Microelectronics

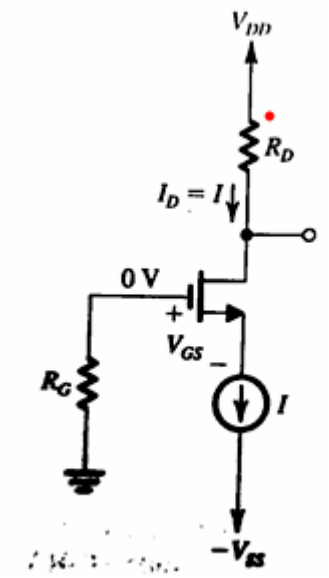
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	What do you mean by clipping circuits? Draw and explain symmetrical double ended diode biased clipper circuit with the help of transfer characteristics.	CO1	PO3	**08**
	b)	Determine the voltage V_{CEQ} and I_{CQ} for the voltage divider configuration of the circuit shown in Figure 1.b) R1=39kΩ, R2=3.9kΩ, RC=10kΩ, RE=1.5kΩ, C1=10μF, C2=10μF, CE=50μF, β= 140 and VCC=22 volts.  Fig.1.b)	CO1	PO3	**08**
	c)	Draw the circuit diagram of BJT re Transistor model.	CO1	PO3	**04**
		OR			
2	a)	Design a clamper circuit to perform the function indicated in Fig 2.a.	CO1	PO3	**06**

			 Fig.2.a.			
		b)	For the circuit shown in Fig.2.b. Determine the DC bias voltage VCE and IC for the voltage divider BJT circuit. Given R1=16kΩ, R2=9.2kΩ, RC=3.9kΩ, RE=680 Ω, VCC=16 volts and β=80.  Fig.2.b.	*CO1*	*PO3*	**08**
		c)	For the network of Figure 2.c., determine: i). Z_I, ii). Z_o, iii). A_v, iv). A_i  Fig. 2.c.	*CO1*	*PO3*	**06**
			UNIT - II			
	3	a)	Discuss the factors that affects the low frequency response of a BJT- CE amplifier.	*CO2*	*PO3*	**06**

		b)	Prove that Miller effect capacitance, $\mathbf{C_{Miller} = (1\text{-}AV) \cdot Cf}$.	*CO2*	*PO3*	**06**
		c)	Name four topologies of the feedback amplifiers. Draw the block schematic of voltage series feedback amplifier and also voltage series feedback Amplifier having gain A = - 100, R_{in}= 10 kΩ and Rout = 20 kΩ for feedback , β =- 0.1.	*CO2*	*PO3*	**08**
			UNIT - III			
	4	a)	How are power amplifiers classified? and explain them in brief.	*CO2*	*PO3*	**06**
		b)	The class A transformer coupled power amplifier has zero signal collector current of 50 mA. If the collector supply voltage is 5 V, find (i) the maximum a.c. power output (ii) the power rating of transistor (iii) the maximum collector efficiency.	*CO3*	*PO3*	**06**
		c)	Derive expression for efficiency of Class B push-pull amplifier. For a class B Amplifier providing a 20V peak signal to a 16Ω load (speaker) and a power supply of Vcc =30V. Determine the input power, output power and power efficiency.	*CO4*	*PO4, PO5*	**08**
			UNIT - IV			
	5	a)	Discussing the Basic Structure of MOSFET, explain its principle of Operation of MOSFETS.	*CO2*	*PO2*	**10**
		b)	For the given circuit in Figure 5(b) $\mathbf{I_{D(ON)} = 6\ mA, V_{GS(ON)} = 8V, V_{GS(TH)} = 3V}$. Calculate V_{GS}, I_D and V_{GS}.  Fig. 5(b)	*CO3*	*PO3*	**10**
			UNIT - V			
	6	a)	Draw the T Equivalent circuit model of MOS device and comment on the gate current value.	*CO3*	*PO3*	**10**
		b)	Figure 6.b. Shows the basic circuit of single-stage MOS amplifier. Consider for the case $V_{DD} = V_{SS}$ = 10 V, I = 0.5 mA, R_G = 4.7 MΩ, R_D = 15 kΩ, $\mathbf{V_t}$ = 1.5 V, and k_n' = 1mA/V^2. Find V_{OV},V_{GS}, V_S and V_D. Also , Calculate the values of g_m, r_o, assuming the V_A = 75 V. What is the maximum possible signal swing at the drain for which MOSFET remains in satuartion.	*CO4*	*PO4, 5*	**10**

			 Fig 6.b.			
			OR			
	7	a)	For Small-signal operation of the enhancement MOSFET amplifier, derive $A_v = v_d / v_{gs} = -gm.R_D$.	*CO2*	*PO2*	**06**
		b)	Draw and explain FET based phase shift oscillator with circuit diagram.	*CO5*	*PO2, PO3*	**08**
		c)	Analyze the Wilson MOS mirror circuit with improved performance. Justify for the reducing β dependency and increase in output resistance in Wilson MOS mirror circuits.	*CO5*	*PO2, PO3*	**06**

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