U.S.N.										

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

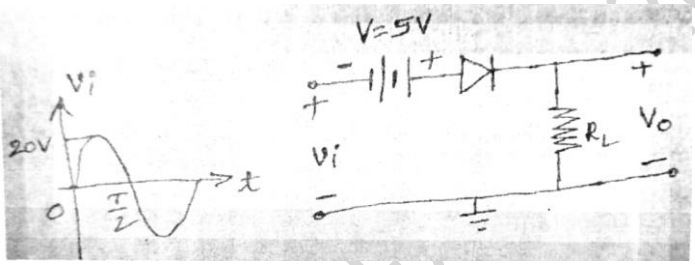
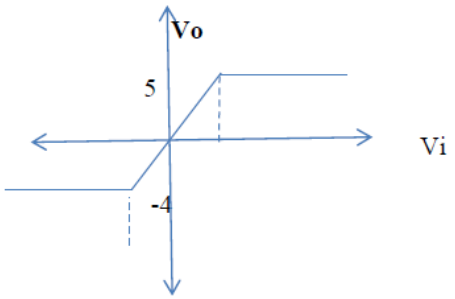
Autonomous Institute Affiliated to VTU

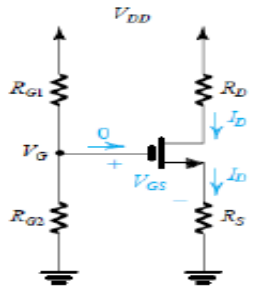
June 2025 Semester End Main Examinations

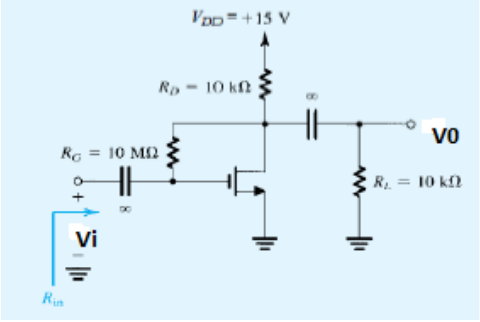
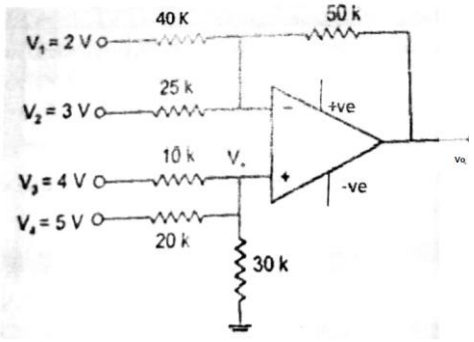
Programme: B.E. **Semester: III**
Branch: Electronics and Communication Engineering **Duration: 3 hrs.**
Course Code: 22EC3PCAEC **Max Marks: 100**
Course: Analog Electronic Circuits

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)		Determine the output waveform for the sinusoidal input of the figure1.  Figure1	CO2	PO 1	06
	b)		Determine input impedance, output impedance and voltage gain from ac equivalent circuit of a voltage divider biasing of BJT.	CO2	PO1	06
	c)		Analyze voltage divider bias circuit using exact analysis.	CO1	-	08
			OR			
2	a)		For the following transfer characteristics in figure 2 identify and analyze the circuit, also obtain the output wave form if the input wave form is 10sinwt.(assume Si diode)  figure 2	CO3	PO2	8
	b)		For CE amplifier with voltage divider bias, calculate r_e, Z_i, Z_o, A_v, A_i if R_1=47KΩ, R_2=8.2KΩ, R_C=6.2KΩ, R_E = 1.5KΩ, β=90.	CO3	PO2	12
			UNIT - II			
3	a)		Write the block diagram of the following indicating A, A_f and β.	CO1	-	10

			i) Voltage series feedback amplifier (ii)Voltage shunt feedback amplifier (iii) Current series feedback amplifier and (iv) Current shunt feedback amplifier.			
		b)	Describe the working principle of a class A transformer coupled power amplifier circuit. Show that maximum power conversion efficiency is 50% for class A power amplifier.	***CO2***	***PO1***	**10**
			OR			
	4	a)	With a neat diagram and waveforms, explain the working of complementary symmetry class B power amplifier. Also derive an expression for conversion efficiency.	***CO1***	-	**12**
		b)	A voltage series feedback amplifier has RB=50 KΩ, RC=2.7 KΩ, RE=600Ω, VCC= 15 V, hfe=200, hie=1000 Ω. Calculate (1) AV & AVf (2) Ri & Rif (3) RO & Rof.	***CO2***	***PO1***	**8**
			UNIT - III			
	5	a)	Analyse biasing by fixing V_{GS} in a MOSFET with i_D-V_{GS} characteristics.	***CO3***	***PO2***	**08**
		b)	Design the circuit in Fig 3 to establish a DC drain current I_D=0.5mA.The MOSFET is specified to have V_t=1V and $k_n'W/L$ =1mA/V^2. For simplicity neglect the channel-length modulation effect. Use a power supply V_{DD}=15V.Calculate the percentage change in the value of I_D obtained when the MOSFET is replaced with another unit having the same $k_n'W/L$ but V_t=1.5V  Fig 3	***CO4***	***PO3***	**08**
		c)	Derive the expression for the signal current in the drain terminal for small signal operation with the help of a neat conceptual amplifier circuit.	***CO2***	***PO1***	**04**
			OR			
	6	a)	With the neat circuit diagram, Explain the biasing of MOSFET using a Drain to Gate feedback resistor.	***CO1***	-	**08**
		b)	Analyze the circuit in Fig 4 and determine its small-signal voltage gain, its input resistance and the largest allowable input signal. The transistor has Vt=1.5V, $k_n'W/L$ =0.25mA/V^2 and V_A=50V. Assume the coupling capacitors to be sufficiently large so as to act as short circuits at the signal frequencies of interest.	***CO3***	***PO2***	**08**

			 Fig 4			
		c)	Derive the expression for the voltage gain of a MOSFET amplifier. Draw the instantaneous waveforms of V_{GS} and V_{DS}.	***CO2***	***PO1***	**04**
			UNIT - IV			
	7	a)	Derive the expression for R_{in}, A_V, A_{V0}, G_m and R_0 for CS amplifier for small signal analysis.	***CO2***	***PO1***	**10**
		b)	Analyze the three different relationships for determining transconductance g_m.	***CO 3***	***PO 2***	**10**
			OR			
	8	a)	Derive the expression for input resistance, output resistance, voltage gain and overall voltage gain of a common gate MOSFET amplifier	***CO2***	***PO2***	**10**
		b)	With suitable diagrams and equations deduce an expression for current gain in a current mirror circuit.	***CO2***	***PO1***	**10**
			UNIT - V			
	9	a)	With a neat circuit diagram, explain Instrumentation amplifier using op-amp.	***CO1***	-	**10**
		b)	With a neat functional diagram, explain the working of 555 timer as an Astable multivibrator. Derive the expression for time period and duty cycle.	***CO2***	***PO1***	**10**
			OR			
	10	a)	Find the output voltage for the circuit shown in the figure 5  Fig 5	***CO2***	***PO1***	**10**
		b)	With a neat block diagram explain Phase Locked Loop	***CO1***	-	**10**

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