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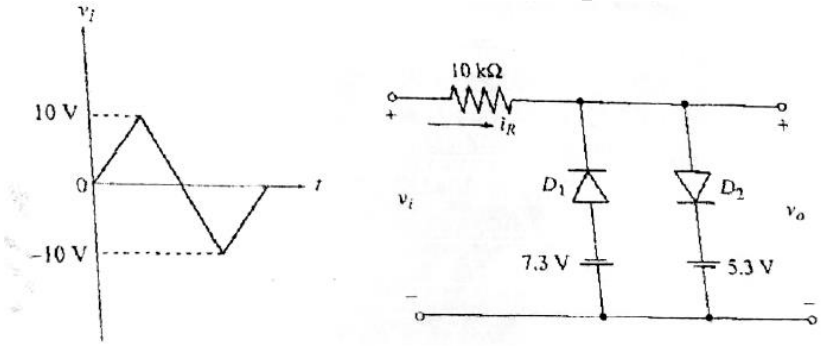
B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Electronics and Telecommunication engineering **Duration: 3 hrs.**
Course Code: 22ET3PCALC **Max Marks: 100**
Course: Analog and Linear circuits

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

		UNIT - I	CO	PO	Marks
1	a)	Derive the equations for voltage gain, current gain, input impedance and output impedance for a voltage divider configuration using r_e model.	CO3	PO2	**10**
	b)	For the circuit shown below, determine the transfer characteristics and sketch the waveform for V_0 and I_R. Assume silicon diodes. 	CO2	PO1	**10**
		OR			
2	a	Explain the following with circuit diagram and waveform. i)positive peak clamper ii) Negative peak clamper	CO1		**10**
	b	A voltage divider bias CE amplifier has V_{CC} = 14V, R_1 =33KΩ, R_2=6.8KΩ, R_C= 1KΩ, RE =470Ω. The silicon transistor used has a β=100, C_{C1} =0.01μf, C_{C2}= 0.1 μf , C_E= 47μf. With thehelp of r_e model, find the voltage gain, input impedance, output impedance	CO2	PO1	**10**
		UNIT - II			
3	a)	With a neat circuit diagram, waveforms, explain the working of complementary symmetry class B amplifier. Also ,derive an expression for conversion efficiency.	CO1		**08**
	b)	For a class B amplifier providing a 20V peak signal to a 16Ω load speaker and a power supply of V_{cc}=30V, determine the	CO2	PO1	**06**

			input power, output power and circuit efficiency.			
		c)	For a hormonic distortion reading of D_2=0.1, D_3=0.02 and D_4=0.01 with i_1=4A and R_c=8Ω, calculate the total harmonic distortion, fundamental power component and total power	*CO2*	*PO1*	**06**
			OR			
	4	a)	With a neat block diagram derive expressions for gain with feedback, input impedance and output impedance for current series feedback configuration.	*CO1*		**10**
		b)	Calculate gain, input and output admittance for current series feedback amplifier with A=-300, R_i=1.5KΩ,R_0=50KΩ and feedback fraction β= -1/15.	*CO2*	*PO1*	**04**
		c)	Derive an expression for miller effect induced input and output capacitance for an inverting amplifier	*CO2*	*PO1*	**06**
			UNIT - III			
	5	a)	Derive an expression for transconductance and voltage gain of a common source NMOS amplifier	*CO2*	*PO1*	**10**
		b)	Consider a common source amplifier circuit with resistor R_s and current source biasing where g_m=0.5mA/V,V_{DD}=15V,V_{ss}= -15V,R_G=5MΩ,R_D=10KΩ,R_L=12KΩ,R_S=2KΩ and R_{sig}=100Ω.Find R_{in},R_{out},A_v,A_{v0} and G_v. Write its circuit diagram.	*CO2*	*PO1*	**10**
			OR			
	6	a	What is biasing? What are the types of biasing in MOSFET amplifiers? Explain each with circuit diagram	*CO1*		**10**
		b	Explain the effects of biasing by fixing V_{GS} in a MOSFET with i_D-V_{GS} characteristics.	*CO1*		**10**
			UNIT - IV			
	7	a)	Explain with relevant circuit diagrams and equations how the total output offset voltage of an op-amp due to non-ideal DC characteristics is assessed.	*CO1*		**06**
		b)	Explain the following with respect to op-amp 741. i)Open loop gain as function of frequency ii)Closed loop gain as a function of frequency.	*CO1*		**06**
		c)	With a neat circuit diagram, explain the working of instrumentation amplifier by deriving an expression for its output. What are the characteristics of instrumentation amplifiers?	*CO1*		**08**
			OR			
	8	a)	Explain full wave precision rectifier along with circuit diagram and necessary equations.	*CO1*		**10**
		b)	Explain inverting and non-inverting comparator with positive and negative reference voltages along with circuit diagram and waveform	*CO2*	*PO1*	**10**
			UNIT - V			
	9	a)	With a neat pin diagram, explain the working of 555 timer as astable multivibrator to get a duty cycle of 50%.Draw the relevant waveforms. Derive an expression for its frequency of	*CO1*		**08**

			oscillation			
		b)	Design a monostable multivibrator using 555 timer to get a pulse width of 4msec assuming C=0.05μF.Derive the necessary equation.	*CO3*	*PO2*	**06**
		c)	Define capture range, lock range and pull-in –time of PLL.	*CO1*		**06**
			OR			
	10	a)	With a neat diagram explain the working of monostable multivibrator. Draw the relevant waveforms.	*CO1*		**10**
		b)	Explain briefly the following DAC/ADC specifications. i)Resolution, (ii) Linearity an (iii) Accuracy	*CO1*		**05**
		c)	Explain the working of 4 bit weighted resistor DAC. Write its truth table taking V_{ref}=5V	*CO1*		**05**

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