U.S.N.										

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

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

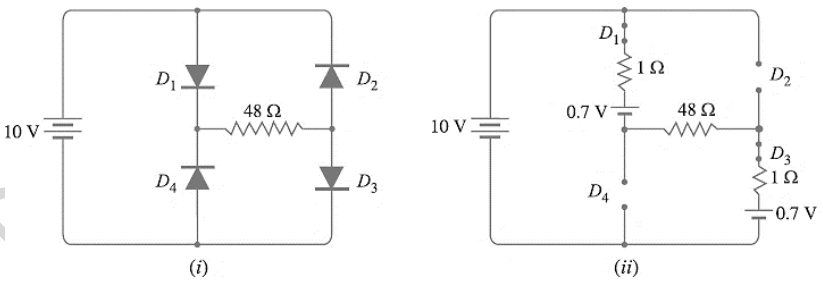
Programme: B.E. **Semester: III**

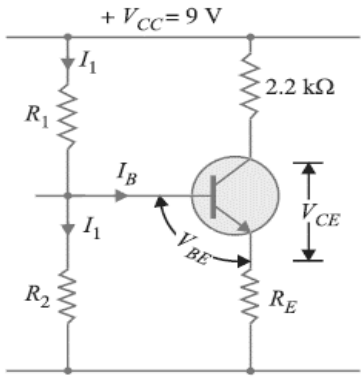
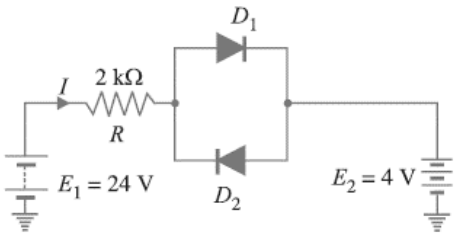
Branch: MD/EIE **Duration: 3 hrs.**

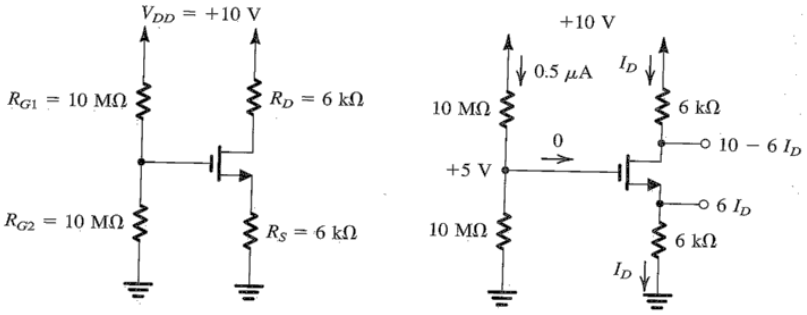
Course Code: 23ES3PCAME / 22ES3PCAME **Max Marks: 100**

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.

			UNIT - I	*CO*	*PO*	Marks
1	a)		With the circuit, discuss the working and plot the input and output waveform for a series negative clipper, Series positive clipper, biased shunt clipper.	*CO2*	*PO2*	**08**
	b)		Explain the working and the output waveform for Positive and negative clamping circuits, without and with biasing. considering square wave input.	*CO2*	*PO2*	**08**
	c)		Calculate the current through 48 Ω resistor in the circuit shown in Fig. 1c. Assume the diodes to be of silicon and forward resistance of each diode is 1 Ω.  **Fig. 1c**	*CO2*	*PO2*	**04**
			OR			
2	a)		Explain the exact and approximate design of voltage divider bias for a transistor.	*CO2*	*PO2*	**10**

		b)	In the circuit shown in Fig. 2(b), the operating point is chosen such that IC = 2mA, VCE = 3V. If RC = 2.2 kΩ, VCC = 9V and β = 50, determine the values of R1, R2 and RE. Take VBE = 0.3V and I1 = 10IB  Fig. 2b	*CO3*	*PO2*	**06**
		c)	Determine the current I in the circuit shown in Fig. 2c. Assume the diodes to be of silicon and forward resistance of diodes to be zero.  Fig. 2c	*CO3*	*PO2*	**04**
			UNIT - II			
	3	a)	Write the block diagram of the following indicating A, A_f and β. a. Voltage series feedback amplifier b. Voltage shunt feedback amplifier c. Current series feedback amplifier d. Current shunt feedback amplifier.	*CO2*	*PO3*	**10**
		b)	Derive an expression for Millers input and output capacitance	*CO2*	*PO3*	**10**
			OR			
	4	a)	A voltage-series negative feedback amplifier has a voltage gain without feedback of A = 500, input resistance R_i = 3 KΩ, output resistance R_o = 20 KΩ and feedback ratio β = 0.01. Calculate the voltage gain A_f, input resistance R_{if} and output resistance R_{of} of the amplifier with feedback.	*CO2*	*PO3*	**06**
		b)	With a neat sketch of the gain-frequency response of an RC coupled amplifier, discuss the fall in gain at very low and at very high frequencies.	*CO2*	*PO3*	**10**
		c)	Describe the type of feedback used in Oscillators and list the applications of oscillators.	*CO2*	*PO2*	**04**

			UNIT - III			
	5	a)	Discuss the working principle of class B power amplifier circuit. Derive an equation for power conversion efficiency.	*CO2*	*PO2*	**10**
		b)	A 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 ac power output (ii) the power rating of transistor (iii) the maximum collector efficiency.	*CO2*	*PO2*	**10**
			OR			
	6	a)	Explain 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*	*PO2*	**10**
		b)	Define total harmonic distortion in power amplifiers. Calculate the harmonic distortion components for an output signal having fundamental amplitude of 3V, second harmonic amplitude of 0.5 V, third harmonic amplitude of 0.1 V, and fourth harmonic amplitude of 0.05 V. Determine the total harmonic distortion.	*CO2*	*PO2*	**05**
		c)	With a neat circuit diagram, waveforms, explain the working of complementary symmetry class B amplifier.	*CO1*	*PO1*	**05**
			UNIT - IV			
	7	a)	Explain the basic construction and operation of N-channel enhancement type MOSFET, and explain its characteristics.	*CO2*	*PO2*	**10**
		b)	Derive an expression for i_D when the n-channel enhancement MOSFET which operates in (a)Triode region. (b)Saturation region	*CO2*	*PO2*	**10**
			OR			
	8	a)	With relevant circuit discuss MOSFET as an amplifier and as a switch	*CO2*	*PO2*	**12**
		b)	Analyze the circuit shown in the figure 8b to determine the voltages at all nodes and the currents through all branches. Let V_t = 1V and k'n(W/L) = 1mA/V^2. Neglect the channel length modulation effect (assume that lambda = 0).  Fig 8b	*CO2*	*PO2*	**08**

			UNIT - V			
	9	a)	Derive expression for input resistance, output resistance, voltage gain and overall voltage gain of a common drain MOSFET amplifier	*CO2*	*PO2*	**10**
		b)	Explain with equations the basic MOSFET as current source.	*CO3*	*PO3*	**10**
			OR			
	10	a)	Write the T equivalent model of a MOSFET.	*CO2*	*PO2*	**10**
		b)	With a neat circuit of CS amplifier, derive the three different relationships for determining g_m of a MOSFET	*CO2*	*PO2*	**10**

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