U.S.N.										

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

Autonomous Institute Affiliated to VTU

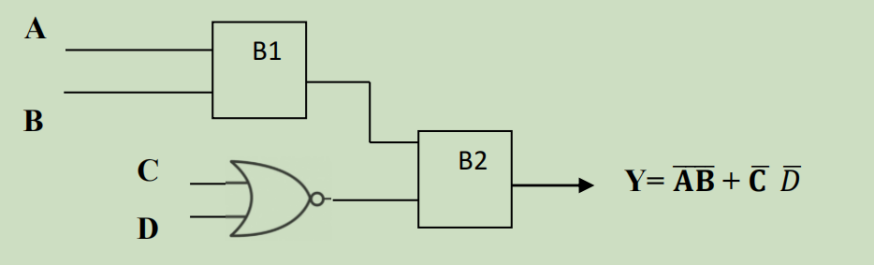
September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EC1ESBEC / 22EC2ESBEC **Max Marks: 100**
Course: Basic Electronics

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)	Explain the V-I characteristics of PN junction diode with Shockley's equation.	-	-	**6**
	b)	A half wave rectifier circuit is supplied from a 230V, 50Hz supply with a step-down ratio of 3:1 to a resistive load of 10kΩ. Diode forward resistance is 75Ω, while transformer secondary resistance is 10Ω. Calculate maximum, average, RMS value of current, DC output voltage, efficiency of rectification and ripple factor.	*CO1*	*PO1*	**10**
	c)	A 9V reference source is to be designed using a Zener diode and a resistor connected in Series to a 30V supply. Select suitable components and calculate the circuit current when the supply voltage drops to 27V. Assume Zener current is 20mA	*CO3*	*PO3*	**4**
		OR			
2	a)	The diode current is 0.6mA when the applied voltage is 400mV and 20mA when the applied voltage is 500mV. Determine η. Assume V_T= 25mV	*CO1*	*PO1*	**5**
	b)	Derive the expression for Ripple factor and efficiency of Bridge rectifier.	*CO1*	*PO1*	**10**
	c)	In a Half Wave rectifier, the input voltage v=300sin314t. Find its average output voltage.	*CO1*	*PO1*	**5**
		UNIT - II			
3	a)	Calculate α and β if I_C is measured as 1mA and base current is 25μA. Also determine the new base current to give I_C of 5mA.	*CO1*	*PO1*	**6**
	b)	With a neat diagram, explain the input and output characteristics of a transistor in common emitter configuration.	-	-	**10**
	c)	An amplifier has mid band gain of 125 and a bandwidth of 250KHz. i. If 4% negative feedback is introduced, find the new bandwidth and gain. ii. If bandwidth is restricted to 1MHz, find the feedback ratio.	*CO1*	*PO1*	**4**

			UNIT - III			
	4	a)	Derive the output expression of an operational amplifier as a summing amplifier and averaging circuit.	*CO1*	*PO1*	**8**
		b)	In a phase shift oscillator that uses three RC sections, R_L=R=10kΩ . If the oscillator is to generate frequencies in the range from 1to100 kHz, what should be the range of C?	*CO1*	*PO1*	**5**
		c)	With relevant mathematical equations and diagram explain the working of crystal oscillator.	--	--	**7**
			UNIT - IV			
	5	a)	Perform the following a) $(250.67)_{16}$ = ( )$_2$ = ( )$_{10}$ b) $(952.01)_{10}$ = ( )$_{16}$ = ( )$_8$	*CO1*	*PO1*	**10**
		b)	Simplify the following Boolean expression using Boolean Laws and Realize using only NAND gates. $f(A,B,C) = AB + \bar{A}BC + A\bar{C} + \bar{A}\bar{B}C$	*CO1*	*PO1*	**5**
		c)	Analyze the given circuit to identify the logic used in the blocks B1 and B2 to obtain output Y. 	*CO2*	*PO2*	**5**
			OR			
	6	a)	A bank locker consists of three keys; the locker will get open if any 2 keys are correctly inserted. Design a digital circuit for this scenario.	*CO3*	*PO3*	**5**
		b)	Design a Full Adder circuit using 2 Half adders.	*CO 3*	*PO3*	**10**
		c)	With the state table, explain the working of SR Flip-flop realized using NAND gates.	--	--	**5**
			UNIT - V			
	7	a)	With a neat block diagram explain the components of the basic communication System.	--	--	**10**
		b)	The initial SNR measured at the transmitter was 20 dB. In order to combat the channel conditions, the signal power was doubled prior to transmission. What is the new SNR at the transmitter?	*CO2*	*PO2*	**5**
		c)	Compare 1G, 2G, 3G and 4G technologies of cellular communication.	--	--	**5**

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