U.S.N.										

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

Autonomous Institute Affiliated to VTU

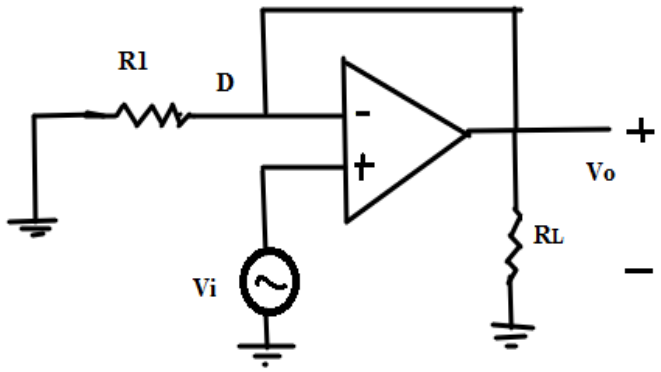
February / March 2025 Semester End Main Examinations

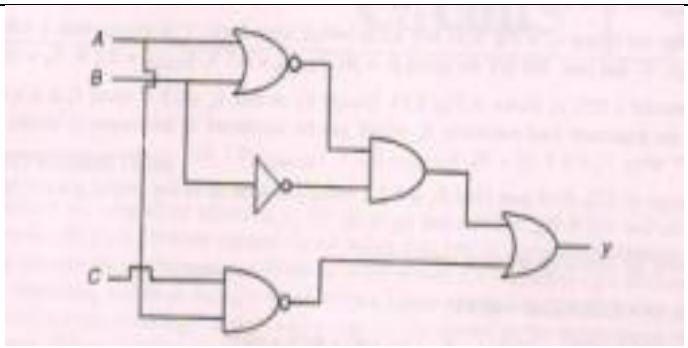
Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22EC1ESBEC / 22EC2ESBEC **Max Marks: 100**
Course: Basic Electronics

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	
1	a)		Derive the expression for Ripple factor and efficiency of Bridge rectifier.	**10**
	b)		State the significance of Shockley's equation. A germanium diode is used in rectifier circuit with reverse saturation current of 1000μA and is operating at a thermal voltage (V_T) of 0.025V. Calculate the value of forward current if it is forward biased by 0.22v. Assume η =1 for germanium.	**05**
	c)		A 5V 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.	**05**
			OR	
2	a)		Explain the V-I characteristics of PN junction diode.	**08**
	b)		Show that in a half wave rectifier, only 40.5% of a.c. input power is converted to d.c power in the load under best condition. How is the efficiency of the rectifier improved?	**07**
	c)		Design a Zener regulator for following specification: Load current, I_L = 20mA output voltage, V_0 = 5 V, Zener wattage, P_z = 500mW, Input voltage, V_i= 12+2V and $I_{Z(min)}$ = 8 mA.	**05**
			UNIT - II	
3	a)		Derive the relationship between various current components of the transistor with the neat diagram.	**10**
	b)		A transistor has I_B= 100μA and I_C= 2mA find i) β ii) α iii) emitter current iv) new value of β, if I_B changes by +25μA and I_C changes by + 0.6mA	**05**
	c)		Mention the advantages of the negative feedback. When negative feedback is applied to an amplifier of gain 100, the overall gain falls to 50. i) Calculate the fraction of the output voltage fed back. ii) If this fraction is maintained, calculate the value of amplifier gain required if the overall gain is to be 75.	**05**

			OR	
	4	a)	With a neat diagram, explain the input and output characteristics of a transistor in common emitter configuration.	**10**
		b)	What is DC load line? Explain with base bias circuit diagram. Explain the significance of DC load line. Plot the DC load line for CE base bias circuit if Vcc = 15V and Rc = 3kΩ.	**10**
			UNIT - III	
	5	a)	With the neat diagram**,** explain the working of the RC phase shift oscillator**.** Mention the criteria to obtain undamped oscillations. In a phase shift oscillator that uses three RC sections, R_L = R = 10 kΩ, if the oscillator is to generate frequencies in the range from 1 to 100 kHz, what should be the range of C?	**08**
		b)	Design an op-amp circuit to obtain an output of $V_o = 2V_1 - 3V_2 - 4V_3 + 5V_4$.	**07**
		c)	Analyze the given circuit to obtain the desired output. Mention the applications of the circuit. 	**05**
			OR	
	6	a)	Describe basic principle of oscillator with a block diagram? Is an external input signal necessary for the output of an oscillator?	**10**
		b)	With neat circuit diagram explain working of Hartley oscillator. What is the frequency of Hartley oscillator if the total inductance of L1 and L2 is 50µH and the capacitance of the resonant circuit is 200nF?	**10**
			UNIT - IV	
	7	a)	Convert the given Octal number, $(567)_8$ to decimal number and hexadecimal number.	**06**
		b)	Realize an Ex-OR function using NAND gates only and verify the truth table using De Morgan's theorem. ii) Realize the logic using AND, OR and NOT gates.	**08**
		c)	Explain the full adder with neat logic circuit and write the truth table.	**06**
			OR	
	8	a)	Analyze the logic circuit shown in fig. Determine the Boolean function for y and state its truth table.	**06**

				
		b)	Simplify the given expression. Realize the simplified expression with the basic gates and draw the truth table for the simplified expression. $X = \bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + A\bar{B}\bar{C}$	**06**
		c)	Explain the clocked RS flip flop with neat waveforms.	**08**
			UNIT - V	
	9	a)	Explain the Frequency modulation technique with relevant diagram. Find the modulation index and carrier swing if a 100MHz carrier wave is frequency modulated by a 10KHz sinusoidal modulating signal with the maximum frequency deviation is 50KHz.	**08**
		b)	With relevant equation, define signal to noise ratio and noise factor. If at a receiver of a communication system, the signal and noise powers are given as 1.2µw and 0.8µw respectively, determine the SNR in dB.	**06**
		c)	Explain the two types of multiplexing with neat diagram.	**06**
			OR	
	10	a)	Write a short note on (i) Cellular communication system (ii) computer communication network.	**10**
		b)	Compare 1G, 2G, 3G and 4G technologies of cellular communication.	**10**

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