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

Autonomous Institute Affiliated to VTU

December 2023 Supplementary Examinations

Programme: B.E.   **Semester: I / II**
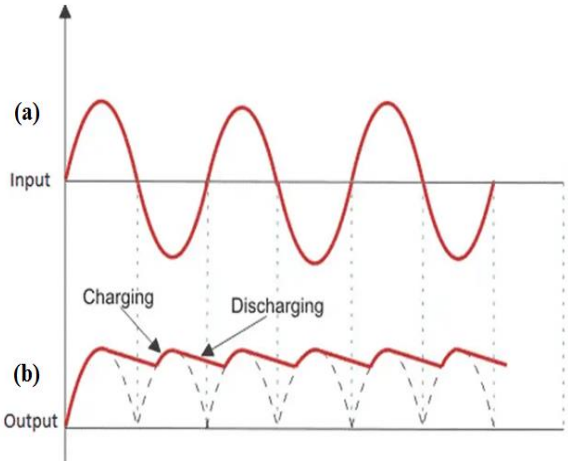**Branch: Common to all Branches**   **Duration: 3 hrs.**
Course Code: 22EC1ESIEL / 22EC2ESIEL   **Max Marks: 100**
Course: Introduction to Electronics Engineering
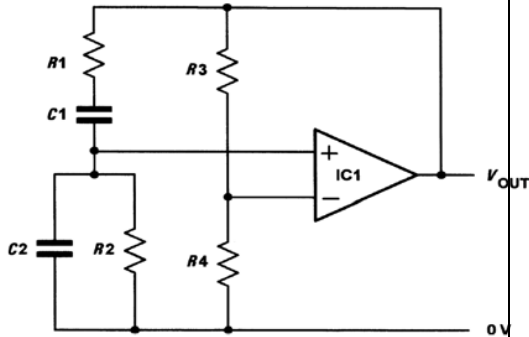
Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

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)		Identify the circuit that converts one half cycle of the input alternating current (ac) to output direct current (dc). Explain it's working with a suitable circuit diagram and waveforms.	CO2	PO2	**06**
	b)		Deduce the relationship between various transistor current and also α and β of a transistor. In a common emitter transistor circuit, if β = 100 and I_B = 50µA, compute the values of α, I_E and I_C.	CO1	PO1	**09**
	c)		A 5 V Zener diode has a maximum rated power dissipation of 500 mW. If the diode is to be used in a simple regulator circuit to supply a regulated 5 V to a load having a resistance of 400 Ω, determine a suitable value of series resistor for operation in conjunction with a supply of 9 V.	CO1	PO1	**05**
			OR			
2	a)		Identify the circuit whose output voltage is double the input voltage and explain it's working with the help of a diagram.	CO2	PO2	**06**
	b)		Analyze the waveforms shown in Fig. 1 and identify a suitable circuit that accepts waveform (a) as input and gives the waveform (b) as output. **Note**: The circuit should use minimum number of diodes. Fig. 1	CO2	PO2	**06**
	c)		The following measurements were made during a test on an amplifier:	CO1	PO1	**08**

		V_{in} = 200 mV, I_{in} = 1.5 mA, V_{out} = 8 V, I_{out} = 350 mA Determine: (a) the voltage gain (in dB); (b) the current gain (in dB); (c) the input resistance. If the voltage gain of the amplifier increases by 30%, find the value of V_{out} for the same input voltage?			
		UNIT - II			
3	a)	Define the following with respect to Op-Amp I. Open loop gain II. Input Resistance III. Input offset voltage	-	-	**06**

	b)	Draw the circuit diagram and corresponding output waveform of an Op-Amp circuit
		    a. If square wave is given at the differentiator input.
		    b. If square wave is given at the integrator input
			CO2	*PO2*	**10**

	c)	Fig. 2 shows the circuit of a Wien bridge oscillator based on an operational amplifier. If $C_1 = C_2 = 100$ nF, determine the output frequencies produced by this arrangement when (a) $R_1 = R_2 = 1$ kΩ (b) $R_1 = R_2 = 6$ kΩ. Fig. 2 Sine wave oscillator based on Wien bridge network	*CO1*	*PO1*	**04**
		UNIT - III			
4	a)	State and prove De Morgan's law.	*CO1*	*PO1*	**08**

	b)	Perform the following conversions
		    a) $(1011101101110001.10111101)_2 = (\ )_{16}$
		    b) $(4EC.6A)_{16} = (\ )_8$
		    c) $(56.12)_{10} = (\ )_2$
			CO1	*PO1*	**06**

	c)	Design a logic circuit using minimum number of basic gates to implement the following expression. $f(W,A,B,C) = WAB\bar{C} + AB\bar{C} + A\bar{B}\bar{C} + A\bar{B}C$	*CO3*	*PO3*	**06**
		OR			
5	a)	Prove the universality of NAND gate.	*CO1*	*PO1*	**05**
	b)	Implement full-adder using half-adders. Give the necessary truth-tables and Boolean expressions.	*CO1*	*PO1*	**10**
	c)	Simplify the following functions i)$F = \bar{A}B + \bar{A}C + BC + A\bar{B}C$ ii)$F = \bar{A}B\bar{C} + \bar{A}\bar{B}C + \bar{A}BC + A\bar{B}C$	*CO2*	*PO2*	**05**
		UNIT - IV			
6	a)	Differentiate between Microprocessor and Microcontroller.	-	-	**05**

		b)	Analyze the working of instrumentation systems with the aid of a block diagram	*CO2*	*PO2*	**06**
		c)	How many 7-segment display units are required to display "EASY"? Write the Binary and hexadecimal equivalent code for each if common-CATHODE 7-segment display is used and give the corresponding circuit diagram.	*CO1*	*PO1*	**09**
			UNIT - V			
	7	a)	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?	*CO1*	*PO1*	**06**
		b)	A 100MHz carrier wave is frequency modulated by a 10KHz sinusoidal modulating signal. If the maximum frequency deviation is 50KHz, find the modulation index. Also find Carrier Swing?	*CO1*	*PO1*	**06**
		c)	Explain the different types of modulation techniques with relevant Waveforms.	-	-	**08**

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