U.S.N.										

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

Autonomous Institute Affiliated to VTU

September 2024 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.

		UNIT – I	CO	PO	Marks
1	a)	Describe the operation of Half Wave Rectifier (HWR) and derive the expression for ripple factor and efficiency.	-	-	**8**
	b)	The following data were obtained during a test carried out on a d.c. power supply: (i) Load test: Output voltage (no-load) = 12 V, Output voltage (2 A load current) = 11.5 V (ii) Regulation test: Output voltage (mains input, 220 V) = 12 V, Output voltage (mains input, 200 V) = 11.9 V Determine (a) the equivalent output resistance of the power supply and (b) the regulation of the power supply.	***CO1***	***PO1***	**6**
	c)	An amplifier produces an output voltage of 2 V for an input of 50 mV. If the input and output currents in this condition are, respectively, 4 mA and 200 mA, determine: (a) the voltage gain; (b) the current gain; (c) the power gain.	***CO1***	***PO1***	**6**
		OR			
2	a)	Discuss the relationship between various Transistor current and also α and β of a transistor.	-	-	**8**
	b)	In a common emitter transistor circuit, if $\beta = 100$ and $I_B = 50\mu A$, compute the values of α, I_E and I_C.	***CO*** 1	***PO1***	**6**
	c)	A mains transformer having a turns ratio of 44:1 is connected to a 220 V r.m.s. mains supply. If the secondary output is applied to a half-wave rectifier, determine the peak voltage that will appear across a load considering a silicon diode.	***CO*** 1	***PO1***	**6**
		UNIT – II			
3	a)	A wideband operational amplifier has a slew rate of 15 V/μs. If the amplifier is used in a circuit with a voltage gain of 20 and a perfect step input of 100 mV is applied to its input, determine the time taken for the output to change level.	***CO*** 1	***PO1***	**6**

		b)	Define the following with respect to Op-Amp : i) Open loop gain ii) Closed loop gain iii) Input Resistance iv) Output Resistance v) Input offset voltage	-	-	**10**
		c)	Determine the frequency of oscillation of a three stage ladder network oscillator in which C = 10 nF and R = 10 kΩ.	***CO1***	***PO1***	**4**
			UNIT - III			
	4	a)	Perform the following conversions: i) $(1E.53)_{16} = (\ )_2 = (\ )_8$ ii) $(01011.1011)_2 = (\ )_{10}$	***CO*** 1	***PO1***	**6**
		b)	A logic circuit has 3 inputs A, B, C and one output Y. Y=B XOR C when A=0, and Y=C when A=1. Simplify the output expression and realize the same using only NAND gates.	***CO*** 3	***PO3***	**6**
		c)	Simplify the following Boolean expression to a minimum number of literals: i) $xy + x\bar{y}$ ii) $(x + y)(x + \bar{y})$ iii) $xyz + \bar{x}y + xy\bar{z}$ iv) $\overline{(A + B)}\ \overline{(\bar{A} + \bar{B})}$	***CO1***	***PO1***	**8**
			OR			
	5	a)	Convert i) $5C7_{16} = (\ )_{10}$ ii) $(756.603)_8 = (\ )_{16}$ iii) $(378.93)_{10} = (\ )_8$	***CO*** 1	***PO1***	**6**
		b)	The rocket motor of an air-launched missile with three inputs (launch, Unsafe- height and target-lock), will operate if and only if any two inputs are high. Design a suitable logic circuit with minimum logic gates.	***CO*** 3	***PO3***	**6**
		c)	Simplify the following Boolean expression to a minimum number literals: i) $ABC + \bar{A}B + AB\bar{C}$ ii) $\bar{X}YZ + XZ$ iii) $(\overline{X + Y})(\bar{X} + \bar{Y})$ iv) $xy + x(wz + w\bar{z})$	***CO1***	***PO1***	**8**
			UNIT– IV			
	6	a)	Explain the classification of embedded systems based on generation, complexity and performance, deterministic behavior and triggering requirements.	-	-	**10**
		b)	Illustrate with diagram the different configurations of 7-segment LED Display.	-	-	**10**

			UNIT – V			
	7	a)	100 MHz FM carrier wave frequency is modulated by 10 kHz sinusoidal modulating signal. If the maximum frequency deviation is 50 kHz, what is the value of modulation index and carrier swing?	***CO*** 1	***PO1***	**4**
		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?	***CO*** 1	***PO1***	**8**
		c)	Define Signal to Noise Ratio with relevant equation. At a receiver of a communication system, the signal and noise voltages are given as 3.5mV and 0.75mV respectively. Determine the SNR in dB.	***CO1***	***PO1***	**8**

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