CBCS SCHEME

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BMT302

Third Semester B.E./B.Tech. Degree Examination, June/July 2024
Analog and Digital Electronics

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	M	L	C
Q.1	a.	Draw and recall the frequency response characteristics of various types of filters.	10	L1	CO1
	b.	Derive expression for gain and phase angle of first order low pass filter and draw its frequency response.	10	L3	CO2
		OR			
Q.2	a.	With the help of block diagram and response curve, show how a band stop filter can be obtained using a low pass, high pass and summing circuits.	10	L1	CO1
	b.	Design a second order high pass filter for a cut-off frequency of 6 kHz and pass band gain of 1.586. Assume $c = c_2 = c_3 = 1000$ pF and $R_f = 10$ KΩ.	10	L2	CO1
		Module – 2			
Q.3	a.	With a neat sketch and relevant equations, explain the operation of Wein bridge oscillator.	10	L2	CO3
	b.	Design a RC phase shift oscillator to generate a sinusoidal output of $f_0 = 100$ Hz. Choose $V_{cc} = \pm 12$V, $I_{B(max)} = 50$ ηA.	10	L3	CO4
		OR			
Q.4	a.	With neat circuit diagram, explain the working of non-inverting comparator. Also write the output waveforms for positive V_{ref} and negative V_{ref}.	10	L2	CO3
	b.	Design an inverting Schmitt trigger to have trigger voltage of ±4V. Use op-amp 741 with supply of ±15V, $\pm V_{sat} = \pm 13.5$V and $I_{B(max)} = 500$ ηA.	10	L3	CO4
		Module – 3			
Q.5	a.	Draw and mention the functions of each pin in 555 timer.	10	L1	CO5
	b.	Determine the operation of IC 555 timer as an Astable Multivibrator.	10	L3	CO5
		OR			
Q.6	a.	Describe the applications of : (i) Monostable multivibrator as frequency divider (ii) Astable multivibrator as square wave oscillator	10	L1	CO5
	b.	Determine operation of IC 555 timer as an monostable multivibrator.	10	L3	CO5

		Module – 4			
Q.7	**a.**	Simplify the Boolean function using K-maps: i) $F(w, x, y, z) = \sum m(1, 3, 6, 9, 11, 14, 15)$ ii) $F(a, b, c, d) = \bar{a}\ b\bar{c}\ \bar{d} + \bar{a}\,b\bar{c}\,d + a\,b\,\bar{c}\,\bar{d} + a\,b\,\bar{c}\ d + a\bar{b}\,\bar{c}\,d + \bar{a}\ \bar{b}\,c\,\bar{d}$	**10**	**L3**	**CO3**
	b.	Explain the construction of full adder circuit from two half adders. Find the expression for Sum and Carry.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Define multiplexer. Construct 4:1 MUX using Basic Gates.	**10**	**L3**	**CO4**
	b.	Explain the operation of 1:4 de-multiplexer with truth table and logic diagram.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain D-flip flop and T – flip flop with neat diagrams and truth table and logic diagram using NAND gates.	**10**	**L2**	**CO6**
	b.	With neat sketch, explain clocked JK flip flop using NAND Gates. Write characteristic table and derive expression for characteristic equation.	**10**	**L3**	**CO6**
		OR			
Q.10	**a.**	Explain the operation of a 3-bit synchronous binary up counter.	**10**	**L2**	**CO6**
	b.	With a neat circuit illustrate the operation of clocked SR flip flop using NAND Gates. Also derive the characteristic equation from truth table.	**10**	**L3**	**CO6**

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