BMT302

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
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.	Elucidate first order high pass filter and derive the gain equation for the same.	10	L3	CO1
	b.	Design a low-pass filter at a cut-off frequency of 4 KHz with a pass band gain of Q. Assume $C = 0.01 \mu F$, draw frequency response for the same.	10	L3	CO1
		OR			
Q.2	a.	Explain the working of an all-pass filter with a circuit diagram, and derive the equations for gain and phase response.	10	L3	CO1
	b.	Design a first order Butterworth high-pass filter with cutoff frequency of 2 KHz and pass-band gain of 2. Plot the frequency response. Assume $C = 0.01 \mu F$.	10	L3	CO1
		Module – 2			
Q.3	a.	With a neat block diagram analyze the oscillator circuit and also derive the condition for oscillates.	10	L3	CO2
	b.	What is Comparator? With a neat sketch explain the operation of non-inverting comparator.	10	L2	CO2
		OR			
Q.4	a.	Design and explain the operation of RC phase shift oscillator for $f_0 = 200$ Hz.	10	L3	CO2
	b.	With the help of input output waveform. Explain the operation of Schmitt trigger circuit.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain the operation of 555 timer as monostable multivibartor and derive the expression for pulse width	10	L3	CO5
	b.	With the help of pin diagram of 555 timer, explain the operation of each pin.	10	L2	CO5

		OR			
Q.6	a.	Explain with neat diagram and waveform the working of astable multivibrator and also derive the equation for total time and duty cycle.	10	L3	CO5
	b.	Elucidate the 555 timer IC as a frequency divider network.	10	L2	CO5

Module – 4

Q.7	a.	Using K-map solve the following and the realize the simplified equation using basic gates. i) $F(w, x, y, z) = \Sigma(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$ ii) $F(A, B, C, D) = A'B'C' + B'C\ D' + A'BCD' + AB'C'$	10	L3	CO3
	b.	Explain the operation of full adder and derive its sum and carry equation with truth table.	10	L3	CO3
		OR			
Q.8	a.	What is a Multiplexer? Realize and explain the operation of quadruple 2 to 1 line multiplexer.	10	L3	CO3
	b.	Design and explain BCD to decimal decoder.	10	L3	CO3

Module – 5

Q.9	a.	Elucidate the operation of clocked SR flip-flop and derive the characteristic equation for the same.	10	L3	CO6
	b.	Design a 4 bit binary ripple counter with timing diagram.	10	L3	CO6
		OR			
Q.10	a.	Explain the operation of clocked D-F/F. Also derive the characteristics equation from truth table.	10	L3	CO6
	b.	Design a 4-bit synchronous binary counter with timing diagram.	10	L3	CO6

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