



CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

21MT32

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

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain first order Low pass Butterworth filter and derive the gain and phase angle equations. (10 Marks)
- b. Design a low pass filter at a cutoff frequency 1KHZ with a pass band gain 2. Using frequency scaling techniques convert 1KHz cutoff frequency to 1.6KHz. Assume $C = 0.01\mu\text{F}$. (06 Marks)
- c. Explain with diagram and waveform double ended shunt clippers. (04 Marks)

OR

- 2 a. Explain first order high pass Butterworth filter and derive the gain and phase angle equations. (10 Marks)
- b. Design a wide band pass filter with $f_L = 100\text{Hz}$ and $f_H = 2\text{KHz}$ and a passband gain of 4. Draw the frequency response curve and calculate the value of a for the filter. Assume $C_1 = 0.05\mu\text{F}$ and $C_2 = 0.01\mu\text{F}$. (06 Marks)
- c. Explain the diagram and waveform biased positive clippers. (04 Marks)

Module-2

- 3 a. Design and explain the working of RC phase shift oscillator for $f_0 = 1\text{KHz}$. Assume $C = 0.0\mu\text{F}$. (10 Marks)
- b. What is Comparator? With a neat diagram and wave form explain zero crossing detectors. (10 Marks)

OR

- 4 a. What is an Oscillator? Mention the conditions required for sustained oscillations and also explain the working of wein bridge oscillator. (10 Marks)
- b. With the help of input and output waveforms. Explain the operation of Schmitt trigger circuit. (10 Marks)

Module-3

- 5 a. Explain the operation of 555 timer as monostable multivibrator and derive the expression for pulse width. (10 Marks)
- b. Design a Astable multivibrator using 555 timer to generate 1KHz signal for i) 50% duty cycle and ii) 70% duty cycle. Assume $C = 0.01\mu\text{F}$. (10 Marks)

OR

- 6 a. Explain with neat diagram and waveform the working of astable multivibrator and also derive the equation for total and duty cycle. (10 Marks)
- b. Explain with neat diagram and wave from square wave oscillator. (10 Marks)

Module-4

- 7 a. Simplify the following Boolean function using K- Map
- $F(w, x, y, z) = \Sigma(0, 1, 2, 4, 5, 6, 8, 9, 12, 13, 14)$
 - $F(ABCD) = A'B'C' + B'CD' + AB'CD' + AB'C'$
 - $F = A'C + A'B + AB'C + BC$ (10 Marks)
- b. Explain the full adder and full subtractor with the help of truth table, derive the expression for sum, carry difference and borrow. (10 Marks)

OR

- 8 a. What is Multiplexer? Explain with logic diagram quadrapole 2 to 1 line multiplexer. (10 Marks)
- b. Design and explain BCD to Decimal Decoder circuit. (10 Marks)

Module-5

- 9 a. Analyze the operation of clocked RS flip-flop also derive characteristics equation from the truth table. (10 Marks)
- b. Explain D flip-flop and T flip-flop with logic diagram and truth table. (10 Marks)

OR

- 10 a. Design a 4 bit Binary Ripple counter using T-flip-flop, also sketch the state diagram and timing diagram. (10 Marks)
- b. With a neat sketch, explain the operation of clocked J-K flip-flop. Also write its truth table and characteristics equation. (10 Marks)
