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## Third Semester B.E. Degree Examination, Aug./Sept. 2020 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. With a neat circuit diagram and waveform, explain Double ended shunt clippers. (07 Marks)
- b. Explain the working of positive clampers with neat circuit diagram and waveforms. (05 Marks)
- c. Explain with a neat diagram the working of RC coupled BJT amplifier and also sketch the frequency response curve. (08 Marks)

**OR**

- 2 a. Explain first order low pass Butterworth filter and derive the gain and phase angle equations. (08 Marks)
- b. Design a low pass filter at a cutoff frequency of 1KHz with a passband gain of 2. Using frequency scaling technique converts 1KHz cutoff frequency of LPF to cutoff frequency of 1.6KHz. Assume  $C = 0.01\mu\text{farad}$ . (06 Marks)
- c. With neat diagram and waveform, explain working of Narrow band reject filter. (06 Marks)

### Module-2

- 3 a. With a neat diagram, explain working of RC phase shift oscillator. (08 Marks)
- b. Explain with a neat diagram the working of wein bridge oscillator. (08 Marks)
- c. What is frequency stability? Mention the conditions for oscillation. (04 Marks)

**OR**

- 4 a. What is a comparator? Explain the working of zero crossing detector. (08 Marks)
- b. Explain the working of inverting comparator as a Schmitt trigger with necessary waveforms. (08 Marks)
- c. For Schmitt trigger with  $R_1 = 100\Omega$ ,  $R_2 = 56K\Omega$ ,  $V_{in} = 1V_{P-P}$  sine wave and the opamp type is 741 with supply voltages =  $\pm 15V$ . Determine  $V_{ut}$  and  $V_{lt}$  (04 Marks)

### Module-3

- 5 a. With a neat diagram and waveform, explain working of monostable multivibrator. (08 Marks)
- b. Derive the expression for pulse width in monostable multivibrator. (06 Marks)
- c. Explain any one application of monostable multivibrator. (06 Marks)

**OR**

- 6 a. Explain with neat diagram and waveform the working of Astable multivibrator, and also derive equation for time and duty cycle. (10 Marks)
- b. Design an astable multivibrator using 555 timer to generate a clock of 1KHz with 60% duty cycle. Modify the circuit designed to with 50% duty cycle. [Choose  $C = 0.01\mu\text{farad}$ ]. (10 Marks)

Module-4

- 7 a. Using K-map solve
- i)  $V = f(w, x, y, z) = \Sigma(1, 5, 7, 8, 9, 10, 11, 13, 15)$  (08 Marks)
  - ii)  $T = f(w, x, y, z) = \pi(1, 3, 8, 10, 12, 13, 14, 15)$ . (06 Marks)
- b. Design a full Adder from two half adder. (06 Marks)
- c. Using 8:1 MUX realize  $f(A B C D) = \Sigma(0, 1, 3, 4, 8, 9, 15)$ . (06 Marks)

OR

- 8 a. What is Multiplexer? Explain with logic diagram quadruple 2 to 1 line multiplexer. (10 Marks)
- b. Design BCD to decimal decoder circuit. (10 Marks)

Module-5

- 9 a. Analyze the operation of clocked RS flip-flop, also derive characteristics equation from truth table. (10 Marks)
- b. Design a 4-bit binary ripple counter. (10 Marks)

OR

- 10 a. Design a synchronous counter to sequence  $0 \rightarrow 2 \rightarrow 3 \rightarrow 6 \rightarrow 5 \rightarrow 1$  using JK flip flop. (10 Marks)
- b. With a neat circuit, analyze the operation of clocked JK flip flop and also derive the characteristic equation from truth table. (10 Marks)

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