

**PULSE & DIGITAL CIRCUITS**

(Electronics &amp; Instrumentation Engineering)

Time: 3 hours

Max. Marks: 70

**PART - A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- Why are RC circuits commonly used compared to RL circuits?
  - What is meant by linear wave shaping?
  - What are all the applications of a comparator?
  - What is the difference between the clipping circuit and clamping circuit?
  - What is the function of commutating capacitors in multivibrator?
  - In an astable multivibrator, the base resistances are  $12.5\text{ k}\Omega$  and the capacitors are of  $0.01\ \mu\text{F}$ . Determine the pulse repetition rate.
  - Draw the diagram of transistor miller time base generator.
  - Give the classification of time base generators.
  - Differentiate TTL and CMOS logic families.
  - Why are sampling gates are called as transmission gates?

**PART - B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT - I**

- 2 Derive an expression for the output of a high pass RC circuit excited by a ramp input and plot the input and output waveforms.

**OR**

- 3 In an RC low pass circuit  $R = 2\text{ k}\Omega$  and  $C = 1\ \mu\text{F}$ . A square wave with half period of  $5\ \mu\text{s}$  is applied as input to this circuit. Determine the output waveform.

**UNIT - II**

- 4 Explain with neat diagram, the functions of various practical clamping circuits.

**OR**

- 5 Explain with neat diagrams and waveforms, the operation of a voltage comparator.

**UNIT - III**

- 6 Explain with the help of a neat circuit diagram, the principle of operation of a mono stable multivibrator and derive an expression for pulse width.

**OR**

- 7 Design an astable multivibrator to generate a 5 kHz square wave with a duty cycle of 50% and amplitude 12 V. Use NPN silicon transistors having  $h_{fe(min)} = 70$ ,  $V_{CE(Sat)} = 0.3\text{ V}$ ,  $V_{BE(Sat)} = 0.7\text{ V}$ ,  $V_{BE(Cutoff)} = 0\text{ V}$  and  $R_C = 2\text{ k}\Omega$ . Draw the waveforms produced at the collector and base of both the transistors.

**UNIT - IV**

- 8 Draw the circuit diagram and waveforms of a transistorized bootstrap time base generator and explain the principle of operation.

**OR**

- 9 Explain the method of pulse synchronization using relaxation devices with examples.

**UNIT - V**

- 10 What are the basic operating principles of sampling gates? Explain the operation of four diode sampling gate.

**OR**

- 11 Compare the performance of various logic families with reference to power dissipation, propagation delay, fan-in and fan-out.

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