R10

SET - 1

II B. Tech II Semester Regular Examinations, August – 2014
PULSE AND DIGITAL CIRCUITS
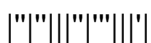(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What is meant by linear wave shaping? Give some examples of linear wave shaping circuits.
    b) Show that the output of a differentiator circuit is derivative of the input. What are the assumptions to be made in the derivation?

2. a) What is meant by comparator? Give the applications of voltage comparators?
    b) Determine the peak output voltage for a negative series clipper circuit connected to an input sinusoidal signal of peak value 12 V. The barrier potential for silicon diode is 0.7 V. Draw the circuit diagram and output waveform.

3. a) Describe and illustrate how the transistor acts a switch?
    b) Compare the various logic families?

4. a) What are different types of multivibrators? Explain the stable state of a multivibrator.
    b) Sketch the circuit diagram of Schmitt trigger and explain its operation.

5. a) In an astable multivibrator, the base resistors are of 12.5 kΩ and the capacitors are of 0.01μF Determine the pulse repetition rate.
    b) With the help of circuit diagrams explain the working of monostable multivibrator.

6. a) Define the following terms:
      i) Time base   ii) Sweep voltage
      iii) Sweep speed error   iv) Displacement error
    b) Enumerate the various methods which are employed for generating time base waves.

7. a) Explain the process of synchronization of a sweep circuit.
    b) Write notes on:
      i) Astable relaxation circuits   ii) Monostable relaxation circuits

8. a) Draw the diagram of two diode sampling gates and explain
    b) Distinguish between *unidirectional* and *bi-directional* sampling gates.

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1. a) Draw RC high-pass circuit. Input to this circuit is represented as $Vu(t) - Vu(t - t_p)$.
    Sketch the input and output waveforms of this circuit.
    b) Explain how new wave shapes are generated from another waveform using some network.

2. a) What is the difference between the output from a clipping circuit and a clamping circuit? Explain with neat sketches.
    b) Determine the peak output voltage for a positive shunt clipper circuit connected to an input AC sinusoidal signal of peak value 10 V. The barrier potential for germanium diode is 0.3 V. Series resistor is of 400 Ω and load resistor is of 2 kΩ.

3. a) Compare the performance of TTL and ECL logic gates with respect to power dissipation, noise margin, cost and propagation delay time.
    b) Draw the circuit, symbol and truth-table of a normally open tri-state switch.

4. a) What is meant by multivibrator? Explain the operation of fixed-bias multivibrator.
    b) Explain how the astable multivibrator can be used as voltage to frequency converter.

5. a) For a monostable multivibrator calculate the input pulse width for the design values of R_C = 2 kΩ, R_B = 10 kΩ, C = 0.1 μF, V_{CC} = 10 V, $V_{BE(sat)}$ = 0.8 V.
    b) Explain the *triggering* in monostable multivibrator.

6. a) How time base generators can be classified? Differentiate between a triggered ramp generator and free-running time base generator.
    b) Explain with circuit diagrams Miller sweep and Miller bootstrap time base generators.

7. a) What are the principles of synchronization? Explain.
    b) Explain how the synchronization of sweep circuit is achieved with symmetrical signals.

8. a) Write notes on diode controlled and RC controlled blocking oscillators.
    b) What are the applications of sampling gates?

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1. a) Define unit-step function, ramp function and impulse function. Show that a pulse is combination of unit-step functions.
   b) What is meant by linear wave shaping?
   c) Why a capacitor in a high-pass RC circuit is named as blocking capacitor.

2. a) Define clipper. Explain the clipping using zero diodes.
   b) Draw a transistor clipper and explain its operation.

3. a) What is the difference between bipolar logic family and unipolar logic family? Explain.
   b) What do you understand by the terms fan-in and fan-out? Draw an RTL circuit.

4. a) Draw the circuit diagram of a Schmitt trigger and explain its operation.
   b) Write the applications of Schmitt trigger?

5. a) What is the function of commutating capacitors? What causes the rounded leading edge in the output waveforms of a multivibrator?
   b) Draw the circuit diagram of astable multivibrator and explains its operation.

6. a) What is meant by time base generator? Explain the expositional sweep circuit.
   b) Explain the basic principles of Miller and Bootstrap time base generator?

7. a) With the help of a circuit diagram explain how a tuned-collector sinusoidal oscillator is synchronized.
   b) Write notes on:
      i) Stability of relaxation dividers   ii) Sine wave frequency division

8. a) What are the basic operating principles of sampling gates?
   b) Explain the operation of four diode sampling gate.

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1. a) What is a differentiator? Discuss how does it operate.
   b) Draw high-pass RC circuit. Explain its response to a square-wave input.

2. a) Explain how clipping at two independent levels can be achieved.
   b) Explain the operation of a diode comparator with a ramp input signal.

3. a) Draw the circuit diagram of CMOS NAND gate and explain its operation.
   b) Compare the performance of TTL and MOSFET logic gates.

4. a) How is an electronic switch superior to a mechanical switch? Why trigger pulses are essential
      for the operation of a bistable multivibrator?
   b) Draw the circuit of collector-coupled astable multivibrator and explain its operation.

5. a) Write notes on the following:
        i) Triggering in monostable multivibrator
        ii) Single-shot multivibrator
   b) Explain how an astable multivibrator gives a square-wave.

6. a) Draw transistor Bootstrap time base generator and explain its operation
   b) Which type of time base generator is used in electromagnetic and electrostatic deflection
      systems? Explain.

7. a) What do you understand by the term phase stability? Explain.
   b) Explain about frequency division in the sweep circuit.

8. Write notes on the following:
   i) Reduction of pedestal in gate circuit
   ii) Monostable blocking oscillators

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