Code No: R1631024   **R16**   SET - 1

III B. Tech I Semester Regular/Supplementary Examinations, March – 2021
PULSE AND DIGITAL CIRCUITS
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
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PART –A   (14 Marks)
1. a) What is the condition of a RC high pass circuit to acts as differentiator?   [2M]
    b) Compare the response of parallel clipper of ideal diode and practical diode.   [2M]
    c) List out the other names of bistable multivibrator.   [2M]
    d) If R_1=10KΩ, R_2=5KΩ and C_1= C_2=0.1µF, find the frequency of the astable output. [3M]
    e) Define sweep time and restoration time.   [3M]
    f) Define AOI gates and write the truth table.   [2M]

PART –B   (56 Marks)
2. a) Prove that RC high pass circuit generates impulses at low time constants when the   [7M]
       square wave is given as input.
    b) Assume an Oscilloscope cable capacitance is 100 pF. The input impedance of the   [7M]
       scope is 2 MΩ in Parallel with 10 pF. What is (i) attenuation of the probe and
       (ii) C for best Response?

3. a) Explain the effect of Cut-in-voltage of diode in a parallel clipping circuit.   [7M]
    b) Explain the positive peak voltage limiters below reference level.   [7M]

4. a) Explain the transistor turn-on and turn-off timings with suitable diagrams.   [7M]
    b) The fixed biased binary uses transistors with the $(h_{fe})_{min}$=20. The circuit parameters [7M]
       are: V_{cc}=12V, V_{BB}= -3V, R_c=1kΩ, R_1=5kΩ, R_2=10KΩ, V_{CE}(sat)=0.3V,
       V_{BE}(sat)=0.7V. Find: (i) the steady state Voltages and currents, (ii) the heaviest load
       it can derive still maintaining one transistor in cut-off and other in Saturation, (iii) the
       maximum I_{CBO} tolerated.

5. a) Design an astable multivibrator to meet the following specifications: [7M]
       V_{cc} =10V, I_c=2mA, h_{FE}=30. The output should be a square wave of 1 KHz with 60%
       duty cycle.
    b) Explain triggering of a monostable multivibrator.   [7M]

6. a) How are linearly varying current Waveforms generated? Explain.   [7M]
    b) Explain the basic principles of Miller and Bootstrap time - base generators.   [7M]

7. a) Draw the circuit of a 3-input OR gate using diodes and resistors and explain the   [7M]
       operation with a Truth Table.
    b) Distinguish between sampling gates and logic gates and also give examples for each   [7M]
       of them.

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PART –A   (14 Marks)

1. a) What is the condition of a RC low pass circuit to acts as an integrator?   [2M]
   b) Define transfer characteristics. Compare the transfer characteristics of a series and parallel clipper at ideal diode condition.   [3M]
   c) Define the Hysteresis loss.   [2M]
   d) Draw the various wave shapes of the astable multivibrator.   [3M]
   e) Classify the time base generators.   [2M]
   f) Draw the diagram of 2-input DTL-NAND gate.   [2M]

PART –B   (56 Marks)

2. a) Prove that RC low pass circuit can convert square wave signal into Triangular wave.   [7M]
   b) Write short notes on a RLC ringing circuit.   [7M]

3. a) Draw the basic circuit diagram of a DC restorer circuit and explain its operation. Sketch the output Waveforms for a Sinusoidal input.   [7M]
   b) Explain the working of a two level diode clipper with the help of neat diagrams.   [7M]

4. a) Estimate the transistor turn-on and turn-off timings if $T_d=T_f=1\mu s$, $T_r=10\mu s$ and $T_s=20\mu s$.   [7M]
   b) Explain symmetrical triggering of bistable multivibrator with a neat circuit diagram.   [7M]

5. a) If $R_1=20 K\Omega$ and $R_2= 10 K\Omega$ and $C_1=C_2=0.01\mu F$, find the frequency and duty cycle of the astable output.   [7M]
   b) With suitable waveforms, explain the function of a Monostable multivibrator.   [7M]

6. a) Explain the principle of an exponential sweep circuit with resultant wave form.   [7M]
   b) Write and prove the relation between slope error(e_s), displacement error(e_d) and transmission error(e_t) with reference to a sweep circuit.   [7M]

7. a) What do you mean by unidirectional and bidirectional sampling gates? Explain.   [7M]
   b) Draw and explain the circuit diagram of a diode OR gate for Positive logic.   [7M]

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PART –A   (14 Marks)

1. a) Define and classify the attenuators.   [2M]
   b) In a clamping circuit R_r =200kΩ, and R_f =300Ω, find resultant resistance value.   [2M]
   c) Define T_{ON} and T_{OFF} of a diode switching time.   [2M]
   d) Define free running multivibrator.   [3M]
   e) Define sweep-speed error.   [3M]
   f) Draw the diagram of 2- input TTL-NAND gate.   [2M]

PART –B   (56 Marks)

2. a) For a low pass RC circuit it is desired to pass a 2 ms sweep of a ramp input, with   [7M]
   less than 0.5% transmission error, determine the upper 3-dB frequency.
   b) Define and explain the damping conditions.   [7M]

3. a) Prove that a 2-level diode clipper circuit can convert Sinusoidal signal into   [7M]
   Square wave.
   b) Write short notes on practical clamping circuits.   [7M]

4. a) Explain the function of piece wise linear model of diode.   [7M]
   b) Discuss the different methods of triggering to a flip-flop circuit. Explain the role   [7M]
   of commutating capacitors in a binary Circuit.

5. a) Find the pulse-width period and frequency of output of an astable multivibrator   [7M]
   for given R_1=R_2 =100kΩ and C_1=C_2=0.1µF?
   b) Define the overshoot and derive the equation for it.   [7M]

6. a) Draw and explain the response curve of bootstrap circuit with respect to different   [7M]
   gate-width conditions.
   b) Draw and explain the transistorized Miller sweep circuit.   [7M]

7. a) Draw the circuit diagram of a NAND gate using TTL logic and explain its   [7M]
   operation.
   b) What is pedestal? How it effect the output of sampling gates?   [7M]

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PART –A   (14 Marks)

1. a) Compare the current response of RLC series and parallel circuits. [2M]
   b) Define negative clamper and negative peak clamper. [2M]
   c) Define storage time, fall time, Rise time, and delay time. [2M]
   d) Draw the various wave shapes of the astable multivibrator. [3M]
   e) If the transmission error is 8 ms, estimate the sweep speed error and displacement error. [3M]
   f) Draw the diagram of DTL NOR gate. [2M]

PART –B   (56 Marks)

2. a) Define Tilt and derive the expression for % of Tilt. [7M]
   b) Explain the use of attenuators in a CRO probe. [7M]

3. a) What is a slicer? Explain the operation of slicer with a circuit diagram. [7M]
   b) Sketch the output waveform for the clipping circuit with reference level +4V and input signal is a triangular wave with peak to peak is 20V. [7M]

4. a) Explain how a Schmitt trigger can be used as a Comparator and as a Squaring circuit? [7M]
   b) Explain with suitable waveforms that diode can be used as a switch? [7M]

5. a) Derive the expression for time period 'T' in a Monostable multivibrator. [7M]
   b) What is rounding? How the rounding distortion is eliminated in astable Multivibrator? [7M]

6. a) Draw the circuit of a transistorized boot-strap generator and explain its working. [7M]
   b) Draw the typical waveform of a time base voltage and clearly indicate the restoration time and fly-back time on it. [7M]

7. a) List out different logic families and explain any one of the family for 'OR' gate design. [7M]
   b) Explain the working principle of a 2-diode sampling gate. [7M]

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