**Code: 13A04401** **R13**

B.Tech II Year II Semester (R13) Supplementary Examinations December 2016

**PULSE & DIGITAL CIRCUITS**

(Common to ECE and EIE)

Time: 3 hours Max. Marks: 70

**PART – A**

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) What is an attenuator? Explain the drawbacks of an uncompensated attenuator.

(b) When does an RLC circuit function as a ringing circuit? What is the relation between quality factor Q and number of cycles N in the response of this circuit?

(c) Discuss various diode clipping circuits that operate with two independent clipping levels.

(d) Write the applications of voltage comparator.

(e) Write the advantages of the d-c bistable multivibrator.

(f) Draw the collector – coupled astable multivibrator circuit and sketch the wave forms.

(g) Write the methods of linearity improvement. Draw the circuits for generating an impulse.

(h) Define the terms Phase delay and Phase jitter.

(i) Define the gain of the bidirectional diode gate.

(j) Draw the block diagram of the sampling scope display.

**PART – B**

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

**UNIT – I**

2 A 10 Hz symmetrical square wave whose peak-to-peak amplitude is 2 V is impressed up on a high-pass RC circuit whose lower 3dB frequency is 5 Hz. Calculate and sketch the output waveform for the first two cycles. What is the peak-to-peak output amplitude under steady-state conditions?

**OR**

3 Consider the response for an exponential input $V_i(t) = V(1-e^{-t/\tau})$ applied to a high-pass RC circuit.

(a) Derive the expression for $V_0(t)$ when n ≠ 1 and when n = 1.

$$v_0(t) = \frac{V_n}{n-1}\left(e^{-x/n} - e^{-x}\right) \qquad if \quad n \neq 1$$

$$v_0(t) = Vx e^{-x} \qquad if \quad n = 1$$

(b) Prove that the peak of the output pulse occurs at: $x = 2.30 \frac{n}{n-1} \log n$.

**UNIT – II**

4 (a) Discuss the various diode clipping circuits that operate with two independent clipping levels.

(b) Draw the circuit to obtain the pulse – type comparator output.

**OR**

5 (a) Draw Emitter coupled clipper circuit neatly and discuss in detail.

(b) Draw the typical diagram of clamping circuit taking source and diode resistances into account.

**UNIT – III**

6 (a) Draw a neat sketch of a fixed–bias n-p-n transistor bistable multivibrator.

(b) Calculate stable- state currents and voltages for the bistable multivibrator circuit consisting of two cross-coupled INVERTER circuits. Assume that the transistors have a minimum $h_{FE}$ value of 20.

**OR**

7 (a) Draw the neat sketch of monostable multivibrator circuit.

(b) Design and calculate the Gate – width of a collector- coupled monostable multivibrator.



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**UNIT – IV**

8 (a) Design a free-running UJT sweep waveform generator with the sweep amplitude of 6 volts. The sweep interval of a waveform is expected to be 3 msec with negligible retrace interval. The slope error $e_s = 0.75$. Determine the values of $R_{b1}$, $R_{b2}$, $V_{BB}$, V, R and C.

(b) Write the Basic principle of Bootstrap time base generators.

**OR**

9 (a) State Synchronization in pulse wave generators.

(b) Describe the pulse synchronization of relaxation devices with neat sketches.

**UNIT – V**

10 (a) Describe the unidirectional diode in detail. Also write the advantages.

(b) Write the applications of sampling gates.

**OR**

11 (a) State AND, OR & NOT gates using diodes.

(b) Write the comparisons between TTL and CMOS logic families.

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