

Code: 13A04401

B.Tech II Year II Semester (R13) Supplementary Examinations December/January 2015/2016

**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) Derive an expression for the upper cut-off frequency of a low-pass circuit.
  - (b) When does a high – pass circuit act as a differentiator?
  - (c) State and prove the clamping circuit theorem.
  - (d) Write the applications of voltage comparators.
  - (e) Write the methods of improving resolution of a binary.
  - (f) Draw a neat schematic of the gated astable multivibrator.
  - (g) Write the methods of generating a time-base waveform.
  - (h) What do you mean by relaxation circuit? Give a few examples of relaxation circuits.
  - (i) What are the applications of sampling gates?
  - (j) Draw circuits of AND, OR and NOT gates using transistors.

**PART – B**

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

**UNIT – I**

- 2 (a) A step generator of  $50\ \Omega$  impedance applies a 10 V step of 2.2 ns rise time to a series combination of a capacitance C and a resistance  $R = 50\ \Omega$ . There appears across R a pulse of amplitude 1 V. Find the value of the capacitance C.
- (b) Briefly discuss about Attenuators.

**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  $V_o(t)$  when  $n \neq 1$  and when  $n = 1$ .
- $$V_o(t) = \frac{V_n}{n-1} (e^{-x/n} - e^{-x}) \quad \text{if } n \neq 1$$
- $$V_o(t) = V_x e^{-x} \quad \text{if } n = 1$$
- (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) Derive the expression for UTP for emitter coupled binary.
- (b) Find the ratio  $V_{CC}/V$ , if a voltage – to – frequency converter generates oscillations of frequency twice of that when  $V = V_{CC}$ .

**OR**

- 7 (a) Design a self-biased symmetrical binary with the following specifications:  $V_{CC} = 10\text{ V}$ ,  $R_C = 1\text{ k}\Omega$ ,  $V_{BE(sat)} = 0.3\text{ V}$ ,  $\beta_{ON} = 20$ , operating frequency up to 80 kHz, impedances of the triggering sources = 250  $\Omega$ .
- (b) What is the purpose of commutating capacitors?

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**UNIT – IV**

- 8 (a) Explain Transistor Bootstrap time-base generator with the help of circuit.  
(b) Draw the Transistorized Miller time-base generator.

**OR**

- 9 (a) Explain in detail about phase delay and phase jitters.  
(b) Explain a sweep generator with synchronization signal with the aid of its circuit.

**UNIT – V**

- 10 (a) With a neat circuit diagram, explain the six-diode sampling gate.  
(b) Briefly discuss about Chopper Amplifiers.

**OR**

- 11 (a) Write the comparisons between different logic families.  
(b) Analyze the RTL, DTL, TTL and ECL.

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