

PULSE & DIGITAL CIRCUITS

(Common to ECE and EIE)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- Derive an expression for the upper cut-off frequency of a low-pass circuit.
 - When does a high – pass circuit act as a differentiator?
 - State and prove the clamping circuit theorem.
 - Write the applications of voltage comparators.
 - Write the methods of improving resolution of a binary.
 - Draw a neat schematic of the gated astable multivibrator.
 - Write the methods of generating a time-base waveform.
 - What do you mean by relaxation circuit? Give a few examples of relaxation circuits.
 - What are the applications of sampling gates?
 - 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 50Ω 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 $V_0(t)$ when $n \neq 1$ and when $n = 1$.
- $$V_0(t) = \frac{V_n}{n-1} (e^{-x/n} - e^{-x}) \quad \text{if } n \neq 1$$
- $$V_0(t) = V_x e^{-x} \quad \text{if } n = 1$$
- (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: $V_{CC} = 10 \text{ V}$, $R_C = 1 \text{ k}\Omega$, $V_{BE(\text{sat})} = 0.3 \text{ V}$, $\beta_{ON} = 20$, operating frequency up to 80 kHz, impedances of the triggering sources = 250Ω .
- (b) What is the purpose of commutating capacitors?

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.
