Pulse and Digital Circuits

Unit Wise Important Questions

Unit-1

1.Derive expression for percent tilt of a RC high pass circuit when square as input?
2.Find the expression for output voltage when a ramp signal is applied to a RC Low Pass filter circuit
3.Explain the operation of a Compensate attenuator
4.Explain diode switching times and transistor switching times
5.What is an attenuator? Explain about over compensation, perfect and under compensation circuits
6.Prove that a low pass circuit acts as an integrator. Derive an expression for the output voltage levels under steady state conditions of a low pass circuit excited by a ramp input (refer 2nd question)
7.Define i) Rise time ii) Fall time iii) Delay time iv) Storage time
8.Draw the output waveform of an RC high-pass circuit with a square wave input under different time constants. Derive the expression for percentage of tilt.
9.Derive an expression for the output of low pass RC circuit excited by a step input. Draw the output for different time constants
10.What is an attenuator? How can an uncompensated attenuator be modified as a compensated attenuator. Give the comparison between perfect compensation, under compensation and over compensation
11.Draw the response of an RC high pass circuit when applied with exponential input. Explain the response for different time constants
12)A square wave whose peak to peak value is 1v extends 0.5v w.r.t ground. The duration of the positive section is 0.1 sec and of the negative section 0.2 sec. If this waveform is impressed upon an RC differentiating circuit whose time constant is 0.2 sec, what are steady state maximum & minimum values of output waveform?

UNIT-2

1) What is clipping in wave shaping? Explain different types of clippers with neat circuits and transfer characteristics.

2)Explain the working of transistor clipper.

3)With neat circuit diagram, explain the working of an emitter coupled clipper.

4)With neat circuit and waveforms explain the operation of double diode clipping.

5) Discuss the operation and applications of voltage comparator.

6) Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics.

7) Explain the principle of clamping. What is the need of resistor R in parallel with diode in basic clamping circuit.
8) Discuss about different types clamping circuits and also give clamper applications.
9)State and prove clamping circuit theorem.
10) Explain the clamping circuit considering the source resistance and the diode forward resistance.

11) A symmetrical 50 Hz square wave whose peak to peak excursions are ± 100 V with respect to ground is to be positively clamped at 25 V. Draw the necessary circuit diagram and output waveform for this purpose.

12)The circuit shown in fig(a) is used to square a 1KHZ input sine wave whose peak is 40V.It is desired that the output voltage wave form be flat for 90% of time. Find the values of V_{R1} and V_{R2}.Assume ideal diodes. At what value of input will the waveform be clipped?

UNIT-3

1)Explain about Diode forward recovery time.

2) Derive the expression for diode reverse recovery time.

3) Draw the circuits of 3-input OR-gate using diodes for:

(i) Positive logic, (ii) Negative logic and explain the operation of circuit.

4)Explain about transistor switching times.

5) Explain the characteristics of logic family.

6) Draw and explain the circuit diagram of integrated positive TTL NOR gates.

7) Draw the circuit diagram of Two in put TTL NAND gate and explain its operation.

8) Draw the circuit diagram of Inverter Using CMOS logic and explain its operation.

9)Design and Explain CMOS NAND gate.

10) Design and explain 2-input ECL OR/NOR gate.

11) Give the comparison of different logic families. Mention the

advantages of CMOS over the other digital logic families.

12) Classify the basic families that belong to the bipolar families and to the MOS

families. What is the major difference between TTL and ECL? Why does the propagation delay occur in logic circuits?

UNIT-4

1) With neat circuit diagram, Explain the working of fixed bias bistable multi vibrator.

2) Explain the operation of a Monostable multivibrator and derive for the pulse width with necessary waveforms & circuits.

3) Draw the circuit diagram of an astable multivibrator and obtain all the steady state voltages and currents. Show how it acts as a voltage to frequency converter.

4) What are transpose capacitors? Explain how the commutating capacitors will increase the speed of a fixed-bias binary.

5) Draw and explain the circuit of a Schmitt trigger and give some of its applications.

6) Derive the equation for voltage-to-frequency converter when astable multi vibrator is used as a basic circuit.

7) The Schmitt trigger circuit also called sinusoidal to square converter? Explain the working principle.

8) Design a Schmitt trigger circuit for the following specification: UTP = 8 V, LTP = 5 V, VCC = 15V, IC (sat) = 2 mA, hFE(min) = 25.

9)Design a collector coupled astable multivibrator using NPN silicon transistors With h_{fe} r_{bb}=200 supploied with Vcc=10V and circuit component values are Rc = 1.2K and C = 2

10)Design and draw a collector-coupled ONE-SHOT using silicon npn transistors with hFE(min) =20. In stable state, the transistor in cut-off has VBE = -1V and the transistor in saturation has base current, IB which is 50% excess of the IB(min) value. Assume VCC = 8V, IC(sat) =2mA, delay time = 2.5ms & R1 = R2. Find RC, R, R1, C and VBB .

11)A self-biased binary uses n-p-n transistors have maximum values of V_{CE}(sat)=0.4V and V_{BE}(sat) = 0.8V and V_{BE} (cutoff) = 0V. The circuit parameters are V_{CC} = 15V, RC = 1K , R1 = 6K , R2 = 15K and RE = 500 . i) Find the stable-state currents and voltages. ii) Find the minimum value of hFE required for BJT to provide the above stable state values. iii) Also determine I_{CBO}(max) to which I_{CBO} raises as temperature rises where neither BJT is OFF

12) What are different types of Multivibrators? Explain stable state of Multivibrator

UNIT-5

1) What are the different methods of generating time-base waveforms? Explain about each briefly.

2) Why the time base generators are called sweep circuits? Give most important applications of time –base generators.

3) Define and derive the terms slope error, displacement error and transmission error.

b) Explain the basic principles of Miller and Bootstrap time-base generators. Give the comparison of both the generation methods.

4) Explain the working of a transistor Bootstrap sweep circuit and derive expression for the slope sweep error.

5) Explain the working of Transistor Miller sweep circuit. What are its advantages over Bootstrap sweep circuits?

6) Explain the working principle of UJT sweep circuit.

7) Explain about Exponential sweep circuit and derive the expression for Slope error

8) The specifications of UJT are given as η =0.6, Vv = 2 V, RBB = 5 kΩ, Iv = 1.5 mA, IP = 8 μA and VBB = 18 V. Calculate the component values of the UJT sweep circuit to generate an output sweep frequency of 10 kHz with sweep amplitude of12 V

9) How is deviation of linearity expressed? What do you mean by sweep time and restoration time?

10) Find the component values of a bootstrap sweep generator, Given VCC = 18 V, IC(sat) = 2 mA and hFE(min) = 30.

11) Derive the expression for sweep time of sweep circuit using UJT

UNIT-6

1) With the help of a neat circuit diagram and waveforms, explain the method to achieve frequency synchronization using pulse train as sync signals.

2) What is meant by synchronization with frequency division? Explain, with suitable waveforms

3) Explain the synchronization of a sweep circuit with symmetrical signals.

4) Draw and explain the waveforms of a frequency division by an Astable multivibrator.

5) Explain how mono stable multi vibrator is used as frequency divider?

6) Explain about unidirectional diode sampling gate. Write its advantages and disadvantages.

b) With neat circuit diagram, Explain bidirectional sampling gate using transistors.

7) Draw and explain the reduction of pedestal techniques in a gate circuit.

8) Explain about four diode sampling gate.

9)Explain the functions of a sampling gate used in sampling scopes also explain how sampling gate is used in chopping amplifiers

10)How the loading of control signal is reduced when number of inputs increases in a sampling gate

11) Explain about phase delay and phase jitters

12) What is meant by synchronization? Why it is needed? Explain.