

Code: 9A04404

II B. Tech II Semester (R09) Regular & Supplementary Examinations, April/May 2012

PULSE & DIGITAL CIRCUITS

(Common to EIE, E.Con.E, ECE,ECC, & MCT)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Three low pass RC circuits are in cascade and isolated from one another by ideal buffer amplifiers. Find the expression for the output voltage as a function of time if the input is a step voltage.
(b) Find the rise time of the output in terms of RC in the above case.
- 2 (a) State and prove clamping theorem.
(b) Plot the transfer characteristics of the circuit shown below. Assume ideal diodes.
- 3 (a) Explain the various switching times involved in transistor. How do you justify that transistor acts as switch?
(b) Describe the breakdown in diodes in detail.
- 4 (a) Design a collector coupled transistor monostable multivibrator to produce a time delay of 100 μ sec. Use transistors have h_{FE} of 250. Use ± 12 v sources, $V_{CE(sat)} = 0.3$ v, $V_{BE(sat)} = 0.7$ v and V_{BE} cutoff = 0v.
(b) Show that the astable multivibrator works as voltage controlled oscillator.
- 5 (a) Define sweep speed, sweep error, sweep duration and sweep types.
(b) For an ideal voltage sweep using ideal current source and ideal switch following data are available. $I_{const} = 1$ ma, $C = 1$ μ f. Voltage level of ideal voltage operated switch is 5 volts. Calculate: (a) sweep speed and (b) sweep duration.
- 6 Clearly explain the concept of synchronization and a synchronization related to the methods of all types of sweep circuits.
- 7 (a) What is the difference between synchronization on one to one basis and two to one basis?
(b) Describe sine wave frequency division with a sweep circuit.
- 8 (a) What are the advantages of ICs over discrete components?
(b) Realize AND, OR and NOT gates using diodes.

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- 1 Explain how RC circuits are used as integrators and differentiators. Sketch the output waveform for square wave input. A pulse of 5 v amplitude and pulse width 0.5 m sec is applied to high pass RC circuit consisting of $R = 22 \text{ k}\Omega$ and $C = 0.47 \mu\text{f}$. Determine the % tilt in the output waveform.
- 2
 - (a) What is meant by clipping in wave shaping?
 - (b) Classify different types of clipper circuits. Give their circuits and explain their operation with the aid of transfer characteristics.
- 3
 - (a) Write short notes on:
(a) Diode switching times. (b) Switching characteristics of transistor.
 - (b) Explain the phenomenon of latching in a transistor.
- 4
 - (a) Explain about the response of Schmitt binary to an arbitrary input signal with appropriate diagram.
 - (b) Explain how Schmitt trigger can be used as a comparator and as a squaring circuit.
- 5
 - (a) Why bootstrap time base generator is called so?
 - (b) What are the various methods of generating sweep voltage? Explain.
- 6
 - (a) Explain the differences between four diode gates and six diode gates.
 - (b) Explain clearly about alternate form of four diode gate.
- 7
 - (a) Explain the generation of saw tooth waveform using RC sweep circuits.
 - (b) What are the factors that affect the phase delay?
- 8
 - (a) Explain with neat diagram the operation of DTL NOR gate.
 - (b) Write about propagation delay in logic families.

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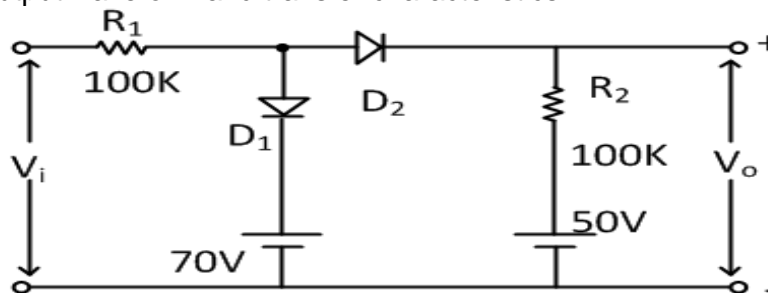
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- 1 (a) Obtain the response of RC high pass circuit for an exponential i/p signal
(b) A square wave, whose peak-to-peak value is 1 V, extends 10.5 V w.r.t. to ground. The half period is 0.1 sec this voltage impressed upon an RC differentiating circuit whose time constant is 0.2 sec. Determine the maximum and minimum values of the i/p voltages in the steady state.
- 2 (a) With the help of neat circuit explain the working of negative clamping circuit. What is the effect of R_s & R_f in clamping circuit output?
(b) The input voltage of the two level clipper is varying linearly from 0 to 80 V. Draw the output waveform and transfer characteristics.



- 3 Explain how a BJT can be used as a switch. Compare its performance as a switch with JFET. Explain all switching times.
- 4 (a) Derive an expression for the period of oscillations of astable multivibrator.
(b) Bring out the effect of supply voltage, junction voltages and temperature on the period of oscillations of the astable multivibrator.
- 5 What are the techniques used to improve the linearity of current sweeps? Illustrate with examples.
- 6 Describe the errors encountered in series sampling and what is the elaborate design procedure that is adopted to minimize these errors.
- 7 (a) Discuss about triggering methods used in multivibrator circuits.
(b) How astable multivibrator can be synchronized?
- 8 (a) Explain the operation of a NAND gate with the help of a circuit diagram.
(b) Explain IC packaging techniques.

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- 1 (a) Explain about RLC ringing circuit.
(b) Explain RC double differentiator circuit.
- 2 (a) What is meant by clipping in wave shaping?
(b) Classify different types of clipper circuits. Give their circuits and explain their operation with the aid of transfer characteristics.
- 3 (a) Explain Piecewise linear characteristics of diode.
(b) Discuss in detail about transistor switching times.
- 4 (a) Draw the circuit diagram of Schmitt trigger and explain its operation. Derive the expression for UTP and LTP.
(b) Discuss the various methods of triggering a multivibrator.
- 5 (a) Explain the operation of bootstrap time base generators.
(b) Explain various methods to achieve a linear sweep waveform.
- 6 Sketch circuit of simple diode bidirectional sampling gate and describe its function with waveforms. Obtain expressions for gain and control voltages.
- 7 (a) Explain about several factors that affect phase delay.
(b) What is the condition to be met for pulse synchronization?
- 8 (a) Compare current spikes in ECL and TTL gates.
(b) What happens if output accidentally gets shorted to ground in CMOS and NMOS?
