

II B. Tech II Semester Regular/ Supplementary Examinations, April/May - 2019**PULSE AND DIGITAL CIRCUITS**

(Com to ECE, EIE, ECC)

Time: 3 hours

Max. Marks: 70

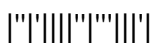
- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**
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PART -A

1. a) What do you mean by compensation? (2M)
- b) State clamping circuit theorem. (3M)
- c) What are the junction diode switching times? (2M)
- d) Write the expression for the frequency of oscillation of an astable multi vibrator. (2M)
- e) What are the General features of a time base signal? (3M)
- f) What are the advantages of diode sampling gates? (2M)

PART -B

2. a) Explain the operation of attenuators. (7M)
- b) Derive an expression for output of a low pass RC circuit excited by step input. (7M)
3. a) Give a brief note on piece-wise linear diode characteristics. (7M)
- b) What are the reasons for existence of rise time and fall time? (7M)
4. Explain the following (7M)
 - a) Collector Catching Diodes (7M)
 - b) Commutating Capacitors
5. a) Explain the principle of operation of Mono-stable multivibrators. (7M)
- b) Design a collector –coupled one shot multivibrator with a gate width of 3ms, using n-p-n transistor. (7M)
6. a) With neat sketch explain the Transistor Miller time base generator. (7M)
- b) With a neat circuit, explain a method of compensation used to improve the linearity of a bootstrap time base circuit. (7M)
7. a) With the help of neat circuit diagram explain the working of six diode sampling gate. (7M)
- b) Compare DTL, TTL and ECL. (7M)



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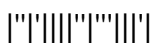
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PART -A

1. a) The input to a Highpass RC circuit is a pulse signal of voltage V. Write the expression for the output voltage. (3M)
- b) Mention the types of clippers. (2M)
- c) Why commutating capacitors are required? (2M)
- d) List the applications of monostable multivibrator. (2M)
- e) What are the Negative Resistance Switches? (2M)
- f) What do you mean by pedestal? (3M)

PART -B

2. a) Derive an expression for output of a high pass RC circuit excited by ramp input. (7M)
- b) With neat sketch explain about Ringing circuit. (7M)
3. a) Design a diode clamper circuit to clamp the positive peaks of the input signal at zero level. The frequency of the input signal is 500 Hz. (7M)
- b) State and prove the clamping circuit theorem. (7M)
4. a) Derive expressions for rise time and fall time in terms of the transistor parameters and operating currents. (7M)
- b) Explain the factors which contribute to the delay time of transistor. (7M)
5. a) Derive the expression for the frequency of oscillation of an astable multivibrator. (7M)
- b) Design an astable multivibrator to meet the following specifications: $V_{CC}=12V$, $I_C=3mA$, $h_{FE}=30$. The output should be a square wave of 1 kHz with 50% duty cycle. (7M)
6. a) What are the different methods of generating time-base waveforms? Explain about each briefly. (7M)
- b) With neat sketch explain Transistor Bootstrap time base generator. (7M)
7. a) With neat sketch explain Diode-Transistor Logic. (7M)
- b) With the help of neat circuit diagram explain the working of four diode sampling gate. (7M)



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PART -A

1. a) What do you Mean by Linear Wave Shaping? (2M)
- b) Define Clamping circuit theorem. (3M)
- c) When does transistor acts as a closed switch? (2M)
- d) Distinguish between Astable Multivibrator and Monostable Multivibrator. (3M)
- e) Why the time base generators are called sweep circuits? (2M)
- f) What is the reason for propagation delay in logic circuits? (2M)

PART -B

2. a) Prove that an RC circuit behaves as a good integrator if $RC > 15T$, where T is the period of an input signal. (7M)
- b) What is an attenuator? How can an uncompensated attenuator be modified as a compensated attenuator? (7M)
3. a) Derive the relation between the tilts in the forward and reverse directions of the output of a clamping circuit excited by a square wave input. (7M)
- b) Explain transfer characteristics of the emitter coupled clipper and derive the necessary equations. (7M)
4. a) Explain the principle of operation of a Schmitt trigger with a neat diagram. (7M)
- b) Explain the principle of operation of self-biased transistor binary circuit. (7M)
5. a) Explain the application of Astable Multivibrator as a Voltage to Frequency Converter. (7M)
- b) Explain the principle of operation monostable multivibrator and also derive the expression for pulse width (gate width). (7M)
6. a) Explain with a circuit the working of UJT sweep circuit and obtain the expressions for the intrinsic standoff ratio. (7M)
- b) With neat sketch explain the principle of Exponential Sweep Circuits. (7M)
7. a) Draw the circuit diagram of a Bidirectional sampling gate and explain its working. (7M)
- b) Draw and explain the 2-input NAND gate using TTL logic. (7M)



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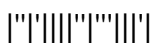
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PART -A

1. a) Write the applications of attenuators. (2M)
- b) What are the other names of clamping circuit? (2M)
- c) Name the devices that can be used as switches? (2M)
- d) What is Triggering of Monostable Multivibrator? (3M)
- e) What are the different methods of Generating Time Base Waveform? (2M)
- f) What are the advantages and disadvantages of TTL? (3M)

PART -B

2. a) Derive and explain the response of RLC circuits for step input. (7M)
- b) 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. (7M)
3. a) Explain the working of negative clamping circuit with the help of neat circuit diagram. (7M)
- b) What are different types of clippers? Explain. (7M)
4. a) Explain the switching characteristics of Transistor? (7M)
- b) A fixed bias Bi-stable multivibrator circuit uses a DC supply of ± 12 V, $R_C=2k\Omega$, $R_1=10k\Omega$ and $R_2=47k\Omega$. NPN silicon transistor with $V_{CE(sat)} = 0.1$ V, $V_{BE(sat)} = 0.7$ V and $h_{FE(min)}=30$ are used
 - i. Draw the circuit diagram and show the stable state currents assuming that transistor Q_1 is OFF and Q_2 is ON. (7M)
 - ii. Calculate all currents and voltages and verify the device states. (7M)
5. a) Explain the Design of Collector Coupled Astable Multivibrator. (7M)
- b) Design a collector coupled Astable multivibrator using NPN silicon transistors with $h_{fe}=40$, $r_{bb}=200\Omega$ supplied with $V_{cc}=10V$ and circuit component values are $R_c=1.2K\Omega$ and $C=270$ pF. (7M)



6. a) Define the three errors that occur in a sweep circuit and obtain an expression for these errors for an exponential sweep circuit. (7M)
b) What are the advantages of Transistor Miller time base generator over Transistor Bootstrap time base generator? (7M)
7. a) Write the basic concept of sampling gate. Mention the applications of sampling gates? (7M)
b) Draw and explain the AND, OR and NOT gates using Diodes and Transistors. (7M)

