Code No: R1622045   **R16**   SET - 1

II B. Tech II Semester Regular Examinations, April - 2018
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)	Describe about ringing circuit?	2M
	b)	Draw the diode based positive clipper and draw its waveforms?	3M
	c)	What are the applications of time base generators?	2M
	d)	Draw the Schmitt trigger circuit?	2M
	e)	Why a monostable multivibrator is called as a delay circuit?	3M
	f)	Give the comparison between TTL and CMOS families?	2M

PART –B

2.	a)	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
	b)	An RC low-pass filter is fed with a symmetrical square wave. The peak-to-peak amplitude of the input waveform is 10 V and its average value is zero. It is given that RC=T/2 where T is the period of the square wave. Determine the peak-to-peak amplitude of the output waveform.	7M
3.	a)	State and prove clamping circuit theorem? And explain the Transfer characteristics of clampers.	7M
	b)	Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics	7M
4.	a)	What are different types of multivibrators? Explain the stable state and quasi stable state of a multivibrator.	7M
	b)	Describe the sequence of events in an n-p-n transistor to change from cut-off to saturation and vice versa. How does temperature affect the saturation junction of a transistor?	7M
5.	a)	Prove that an astable multivibrator works as voltage to frequency converter	7M
	b)	Design a Collector coupled monostable multi using npn sliconi transistors has the same fallowing parameters. V_{CC}=12V, V_{BB}=3V, R_C=2kΩ, R_1=R_2=R=20kΩ, h_{FE}=30,r_{bb}'=200Ω and C=1000pF, neglect I_{CB0}. (a) Calculate and plot to scale the wave shapes at each base and collector. (b) Find the width of the output pulse.	7M

Code No: R1622045   **R16**   SET - 1

6. a) With the help of neat circuit diagram and waveforms explain transistor miller time base generator?   6M

    b) Discuss about the recovery time of a sweep circuit. How do you achieve short recovery time?   8M

7. a) Give the comparison of different logic families?   6M

    b) Draw the circuit diagram of a unidirectional sampling gate which delivers an output only at the coincidence of a number of control voltages and explain its working.   8M

2 of 2

Code No: R1622045   **R16**   SET - 2

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PART –A

1.	a)	Explain the fractional tilt of a high pass RC circuit. Write its expression?	2M
	b)	State the clamping circuit theorem?	2M
	c)	Define Storage time and Transition time of a diode?	3M
	d)	What are commutating capacitors? Why are they required?	2M
	e)	Compare the voltage and current time base generator? Give examples.	2M
	f)	Differentiate between sampling gates and logic gates?	3M

PART –B

2. a) With the circuit diagram and waveforms explain the operation of RC circuits as Integrators and differentiators for a square wave input   7M

b) Draw the different output waveforms of a RC Low Pass circuit when it is applied with Different inputs like (a) Step-voltage input (b) pulse input C) Square input?   7M

3. a) Draw the basic circuit diagram of positive clamper and negative clamper circuits and explain its operation using waveforms?   7M

b) Compare series diode and shunt diode clippers?   7M

4. a) Distinguish between unsymmetrical and Symmetrical triggering? Why it is used?   7M

b) Consider the Schmitt trigger with germanium transistor having h_{fe}=20. The circuit parameter are V_{cc} = 15V, R_s = 2kΩ, R_{c1}= 4kΩ, R_{c2}=1 kΩ, R_1= 3 kΩ ,R_2 = 10 kΩ and R_e= 6 kΩ. Calculate LTP and UTP?   7M

5. a) Explain how to draw the various waveforms and calculate their volatagelevels in an emitter-coupled monostable multivibrator?   7M

b) Design an astable multivibrator to generate a 5kHz square wave with a dutycycle of 60% and amplitude 12v. Use NPN silicon transistors having h_{FE}(min)= 70, V_{CE}(sat) = 0.3v, V_{BE} (sat) = 0.7v, V_{BE} (cutoff) = 0v and RC = 2K. Draw the waveforms seen at both collectors and bases.   7M

6. a) With the help of a neat circuit diagram and waveforms, explain the working of a transistor bootstrap time base generator?   8M

b) List out the different methods for generating time base waveforms   6M

Code No: R1622045   **R16**   SET - 2

7. a) Draw the circuit of FOUR-DIODE sampling gate. Derive expressions for its gain (A) and V_{min}?   7M

   b) Draw and explain the circuit diagram of NAND , NOR gate using DTL logic   7M

Code No: R1622045   **R16**   SET - 3

II B. Tech II Semester Regular Examinations, April - 2018
PULSE AND DIGITAL CIRCUITS
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　　　2. Answer **ALL** the question in **Part-A**
　　　3. Answer any **FOUR** Questions from **Part-B**
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PART –A

1. a) Why sinusoidal waveforms are popular?   2M

   b) What are the disadvantages of unidirectional diode gate and two-diode gates?   3M

   c) Describe astable multivibrator?   2M

   d) Define diode forward recovery time and diode reverse recovery time?   2M

   e) What are the methods of generating a time-base waveform?   2M

   f) What do you mean by one-way and two-way clamping?   3M

PART –B

2. a) With the help of circuit diagrams, explain the working of RC and RL low-pass circuits?   7M

   b) Write short notes on: (i) RL circuits, (ii) RLC series circuits, (iii) RLC parallel circuits, and (iv) Ringing circuits   7M

3. a) With the help of a neat circuit diagram, explain the working of a two-level clipper?   7M

   b) Draw the circuit of a shunt diode positive peak clipper. Assume $R_f=50\Omega$, $V_\gamma=0.6V$, $R_r=2M\Omega$, $R=20K\Omega$ and $V_R=+15V$. Sketch the transfer characteristics when the input voltage varies between -20V and +20V. Indicate the slopes, voltage levels $V_0(max)$ and $V_0(min)$ and the region where the diode conducts. Also sketch the input/output waveforms, if a sine wave of 20V peak is applied as an input. If a load resistance of $30K\Omega$ is connected across the output terminals, sketch the transfer characteristics and the output wave for a 20V peak sine wave input?   7M

4. a) Briefly explain about: (i) Diode switching and (ii) Transistor switching times   6M

   b) With the help of a neat circuit diagram, explain the working of fixed-bias binary? Draw its waveforms.   8M

5. a) Describe a monostable multivibrator and draw the neat diagram with waveforms and explain operation of the collector coupled monostable multivibrator?   7M

   b) Design the Astable Multivibrator to generate 1 KHz square wave. The supply voltage $V_{CC}=10V$, $I_{C(sat)}=10mA$, $h_{FE}=50$ and assume Si transistors.   7M

6. a) What are the general features of time base signal? Explain   6M

   b) Derive the expression for frequency of oscillations of UJT relaxation oscilator   8M

Code No: R1622045   **R16**   SET - 3

7. a)   With the help of a neat diagram, explain the working of a six-diode gate? 6M
    b)   Draw a TTL NAND gate and explain its operation   8M

Code No: R1622045   **R16**   SET - 4

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      2. Answer **ALL** the question in **Part-A**
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PART –A

1. a) What do you mean by time constant of a circuit?   3M

   b) What is the difference between the clipping and clamping?   2M

   c) Define the terms UTP and LTP?   2M

   d) Give other names of monostable multivibrator and write any two applications   2M
      of monostable multivibrator

   e) Define the terms: (i) slope error, (ii) displacement error and (iii) transmission 2M
      error?

   f) What are the merits and demerits of TTL logic?   3M

PART –B

2. a) Describe the relationship between rise time and RC time constant of a low   7M
      pass RC circuit?

   b) Explain the response of RC High Pass circuit for the following input   7M
      waveforms A) Step B) Pulse

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

   b) Describe what is clamping operation? State and prove the clamping circuit   8M
      theorem?

4. a) Discuss about the design of Transistor as a switch?   7M

   b) Design collector coupled fixed-bias Bistable Multivibrator to operate from   7M
      $\pm$6V supply. Given I_C(sat) = 1mA, h_{FE} =35. Assume Si transistor.

5. a) Explain with the help of neat circuit diagram the principle of operation of   7M
      monostable multivibrator, and derive an expression for pulse width?

   b) Design a collector coupled astable multivibrator to meet the following   7M
      Specifications: f=10KHZ, V_{CC}=12V, IC(sat)=4mA and h_{FE}(min)=20.Assume
      that V_{CE} (sat)=0.3V and V_{BE} (sat)=0.7V.

6. a) List out applications of voltage time base generator   6M

   b) Compare the voltage and current time base generator? Give examples and   8M
      explain the basic principles of miller and bootstrap time-base generators?

1 of 2

Code No: R1622045   **R16**   SET - 4

7. a) With the help of a neat diagram, explain the working of a Bidirectional gates using transistors?   7M
   b) Describe ECL logic? With the help of a neat diagram, explain the working of a two-input ECL OR/NOR gate?   7M