Code No: R22021 **R10** SET - 1

II B. Tech II Semester, Regular Examinations, April/May – 2013
PULSE AND DIGITAL CIRCUITS
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Analyze the low pass RC circuits for following inputs, with the help of waveforms:
   i) Step. ii) Exponential
   b) Discuss about attenuators. (8M+7M)

2. a) Give the circuits of different types of shunt clippers and explain their operation with the help of their transfer characteristics.
   b) Draw the diode differentiator comparator circuit and explain the operation of it when ramp input signal is applied. (8M+7M)

3. a) Explain the terms pertaining to transistor switching characteristics.
   i) Rise time. ii) Delay time. iii) Turn-on time.
   iv) Storage time. v) Fall time. vi) Turn-off time.
   b) Give the expression for rise-time and fall-time in terms of transistor parameters and operating currents. (6M+9M)

4. What is a Bistable multivibrator? Explain with the help of a neat circuit diagram the principle of operation of a Bistable multi, and derive an expression for pulse width. Draw the wave forms at collector and Bases of both transistors. (15M)

5. a) Explain how Astable multivibrator can be modified as voltage to frequency convertor.
   b) Why collector catching diodes are used in multi vibrators? (8M+7M)

6. a) With the help of a neat circuit diagram and waveforms, explain working of a transistor Miller time base generator.
   b) Give comparison of Miller and bootstrap sweep generators. (8M+7M)

7. a) With the help of neat waveforms, explain frequency division with respect to a sweep circuit.
   b) What is the condition to be met for pulse synchronization of Monostable circuits? (8M+7M)

8. a) What do you mean by unidirectional and bidirectional sampling gates?
   b) Explain the working of four -diode sampling gate. (8M+7M)
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Time: 3 hours Max. Marks: 75

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1. a) A square wave whose peak-to-peak value is 1V extends ±0.5V with reference 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 output voltage in the steady state.
   b) Draw the response of high pass circuit for square wave and derive the expression for percentage tilt. (8M+7M)

2. a) Draw the circuit of a clipper, clipping at two independent levels and explain the operation of it with the help of transfer characteristics
   b) Write short notes on practical clamping circuits. (10M+5M)

3. a) Draw the circuit of 3-input OR gate which can work for:
   i) Positive logic. ii) Negative logic iii) Use transistor on the circuit and explain its operation.
   b) Discuss TTL logic with the help of circuits. (8M+7M)

4. Calculate the stable state currents and voltages for fixed bias bistable multivibrator. Assume that the transistors have a minimum h_{FE} = 20. Also draw the necessary equivalent circuits. Given data: V_{CC}= 12V; R_C = 2.2K; R_1 = 15K; R_2 = 100K; -V_{BB} = -12V: Also sketch each base and collector voltage. (15M)

5. a) Explain how hysteresis can be eliminated in a Schmitt trigger?
   b) Explain the operation of collector coupled Monostable multivibrator. (8M+7M)

6. a) Explain about the transistor Bootstrap time-base generation.
   b) Explain the basic principle of Miller and Bootstrap time base generators (8M+7M)

7. a) Why synchronization is required in digital systems? What are the different types of synchronization? Give some examples.
   b) What do you mean by synchronization on a one to one basis?
   c) Explain how pulse synchronization differs from sine wave synchronization? (5M+4M+6M)

8. a) What is a sampling gate?
   b) Distinguish between sampling gates and logic gates.
   c) With neat circuit explain bidirectional diode gate and also derive gain of it. (4M+4M+7M)
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Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
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1. a) A 10 Hz symmetrical square wave whose peak -to peak amplitude is 2V is impressed upon a high Pass RC circuit whose lower 3-dB frequency is 5Hz calculate and sketch the output wave form . In particular, what is peak -to-peak output amplitude?
   b) Explain how RC low pass circuit acts as Integrator. (8M+7M)

2. a) State and prove clamping circuit theorem.
   b) Discuss piece wise linear characteristics of diode. (8M+7M)

3. a) Explain the behavior of a BJT as a switch in electronic circuits. Give an example.
   b) Write a short note on the switching times of transistor. (8M+7M)

4. A fixed bias bistable has the following circuit parameters R_c = 1K, R_1 = 3.9K, V_{cc} = +9V and V_{BB} = -9V. Assume for transistor V_{CEsat} = 0V, V_{BEsat} = 0.6 V and $V_{BE(cutoff)}$ = 0 V. Analyze the binary, and find the stable state voltages and currents. What is the minimum value of h_{FE} to satisfy the ON-OFF condition? Draw the circuit diagram and corresponding waveforms at both collectors and bases. (15M)

5. a) Design a collector-coupled Astable multivibrator to generate a square wave of 2.5 kHz.
   b) With the help of a neat circuit diagram and waveforms, explain the working of a Schmitt trigger. (8M+7M)

6. a) What are the methods of generating a time-base wave form?
   b) Define the terms slope error, displacement error and transmission error. How are they related for an exponential sweep circuit? Derive the relation between them. (8M+7M)

7. a) What is phase jitter? Explain how to avoid it in frequency divider?
   b) What is relaxation oscillator? Explain how it is used for synchronization? Name some negative resistance devices used as relaxation oscillators. (8M+7M)

8. a) With a neat circuit explain the operation of Diode controlled Astable blocking oscillator and list out its applications
   b) State applications of sampling gates.
   c) What are the draw backs of two diode sampling gates (7M+4M+4M)
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Time: 3 hours Max. Marks: 75

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1. a) Discuss the response of RC High Pass circuit for square wave input, also sketch necessary waveforms.
   b) Explain how low pass RC circuit acts as integrator. (8M+7M)

2. a) Explain the need for clamping circuits.
   b) Explain the effect of diode characteristics on clamping voltage. (8M+7M)

3. a) Discuss the procedure for the design of transistor switch
   b) Draw the circuit of RTL AND gate and explain the operation with the help of truth table (8M+7M)

4. a) Draw the circuit of a bistable multivibrator with symmetrical collector triggering.
   b) What are commutating capacitors? Show a symmetrical triggering arrangement for bi-stable multivibrator and explain its working. (8M+7M)

5. a) Derive the expression for finding the gate width of mono-stable multivibrator
   b) Draw the circuit diagram of Astable multivibrator and explain its operation why it is called free running oscillator.

6. a) Explain the linearity connection in current sweep circuit.
   b) Explain about transistor current time-base generator. (8M+7M)

7. a) Draw the basic circuit diagram of sweep generator used for synchronization and explain the working of it with waveforms
   b) Explain the pulse synchronization of a sweep generator using UJT with the help of a neat circuit diagram. (8M+7M)

8. a) What is pedestal? How it effect the output of sampling gates?
   b) List out the advantages and disadvantages of each type of blocking oscillators.
   c) Sketch circuit of a simple diode unidirectional sampling gate and describe its functioning with neat waveforms. (7M+4M+4M)
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