

Code No: 07A4EC07

R07**Set No. 2**

II B.Tech II Semester Examinations, APRIL 2011

PULSE AND DIGITAL CIRCUITS

Common to BME, ICE, E.COMP.E, ETM, E.CONT.E, ECE

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

1. (a) Explain how a transistor can be used as a switch.
(b) Explain the phenomenon of 'Latching' in a transistor switch [8+8]
2. (a) Describe the operation of a transistor voltage sweep waveform generator, employing a constant current charging method with the help of its circuit diagram and waveforms.
(b) Mention the drawbacks of the transistor voltage sweep waveform generator and suggest the methods for eliminating those drawbacks.
(c) Define sweep speed, Displacement & transmission errors. [6+6+4]
3. (a) Design an astable multivibrator to generate a 5kHz square wave with a duty cycle of 60% and amplitude 12v. Use NPN silicon transistors having $h_{FE(min)} = 70$, $V_{CE(sat)} = 0.3v$, $V_{BE(sat)} = 0.7v$, $V_{BE(cut-off)} = 0v$ and $R_C = 2K$. Draw the waveforms seen at both collectors and bases.
(b) Explain the operation of bistable multivibrator circuit with circuit diagram and waveform. [8+8]
4. (a) What is phase delay and phase jitter?
(b) Explain the method of synchronization of a sinusoidal oscillator with pulses.
(c) Explain the frequency division in sweep circuit. [4+8+4]
5. (a) Draw the circuit diagram of diode - resistor logic AND gate and explain its operation.
(b) Design a transistor inverter circuit (NOT gate) with the following specifications. $V_{CC} = V_{BB} = 10V$, $i_{csat} = 10mA$; $h_{femin} = 30$; the input is varying between 0 and 10V. Assume typical junction voltages of npn silicon transistor. [16]
6. (a) What are the applications of sampling gates?
(b) What are the advantages and disadvantages of unidirectional diode gate?
(c) Discuss the operation of the four diode bi-directional sampling gate. [4+4+8]
7. (a) A symmetrical square wave of peak -to-peak amplitude 'V' and frequency 'f' is applied to a high pass circuit. Show that the percentage tilt is given by

$$P = \frac{1 - e^{-1/2Rcf}}{1 + e^{-1/2Rcf}} \times 100\%.$$

(b) Compare linear waveshaping with NonLinear wave shaping. [8+8]

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8. (a) For the clipper circuit shown in figure 1 the input $v_i = 60 \sin \omega t$. Calculate and plot to Scale
- The transfer characteristic indicating slopes and intercepts.
 - Input / output on the same scale. Assume ideal diodes.

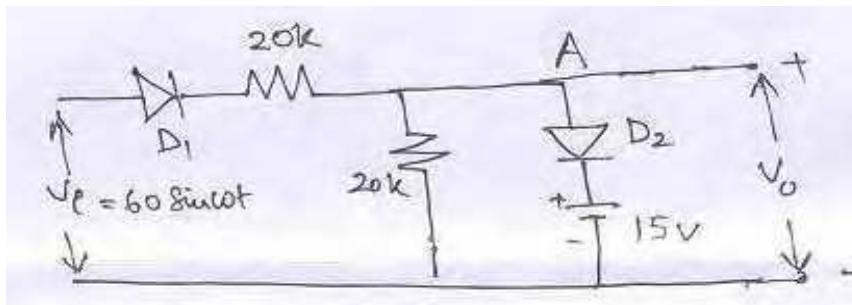


Figure 1:

- (b) Explain positive peak clipping without reference voltage.

[12+4]

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R07**Set No. 4**

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 (b) What are the advantages and disadvantages of unidirectional diode gate?
 (c) Discuss the operation of the four diode bi-directional sampling gate. [4+4+8]
7. (a) For the clipper circuit shown in figure 2 the input $v_i = 60 \sin \omega t$. Calculate and plot to Scale
 - i. The transfer characteristic indicating slopes and intercepts.
 - ii. Input / output on the same scale. Assume ideal diodes.
 (b) Explain positive peak clipping without reference voltage. [12+4]

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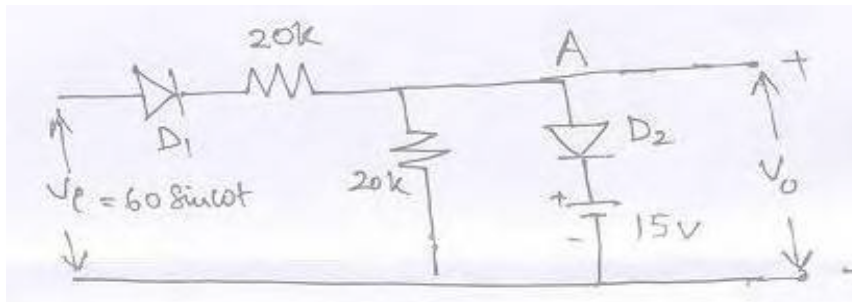


Figure 2:

8. (a) Design an astable multivibrator to generate a 5kHz square wave with a duty cycle of 60% and amplitude 12v. Use NPN silicon transistors having $h_{FE(min)} = 70$, $V_{CE(sat)} = 0.3V$, $V_{BE(sat)} = 0.7V$, $V_{BE(cut-off)} = 0V$ and $R_C = 2K$. Draw the waveforms seen at both collectors and bases.
- (b) Explain the operation of bistable multivibrator circuit with circuit diagram and waveform. [8+8]

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R07**Set No. 1**

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(c) Discuss the operation of the four diode bi-directional sampling gate. [4+4+8]
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(b) Explain the operation of bistable multivibrator circuit with circuit diagram and waveform. [8+8]
5. (a) A symmetrical square wave of peak -to-peak amplitude 'V' and frequency 'f' is applied to a high pass circuit. Show that the percentage tilt is given by $P = \frac{1-e^{-1/2Rcf}}{1+e^{-1/2Rcf}} \times 100\%$.
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Set No. 1

8. (a) For the clipper circuit shown in figure 3 the input $v_i = 60 \sin \omega t$. Calculate and plot to Scale
- The transfer characteristic indicating slopes and intercepts.
 - Input / output on the same scale. Assume ideal diodes.

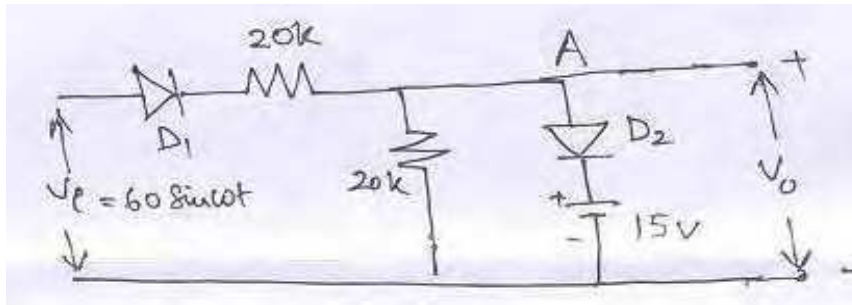


Figure 3:

- (b) Explain positive peak clipping without reference voltage.

[12+4]

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R07**Set No. 3**

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Time: 3 hours

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Answer any FIVE Questions

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(b) Design a transistor inverter circuit (NOT gate) with the following specifications. $V_{CC} = V_{BB} = 10V$, $i_{csat} = 10mA$; $h_{femin} = 30$; the input is varying between 0 and 10V. Assume typical junction voltages of npn silicon transistor. [16]
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4. (a) What is phase delay and phase jitter?
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(c) Explain the frequency division in sweep circuit. [4+8+4]
5. (a) Describe the operation of a transistor voltage sweep waveform generator, employing a constant current charging method with the help of its circuit diagram and waveforms.
(b) Mention the drawbacks of the transistor voltage sweep waveform generator and suggest the methods for eliminating those drawbacks.
(c) Define sweep speed, Displacement & transmission errors. [6+6+4]
6. (a) For the clipper circuit shown in figure 4 the input $v_i = 60 \sin \omega t$. Calculate and plot to Scale
i. The transfer characteristic indicating slopes and intercepts.
ii. Input / output on the same scale. Assume ideal diodes.
(b) Explain positive peak clipping without reference voltage. [12+4]
7. (a) Explain how a transistor can be used as a switch.

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Set No. 3

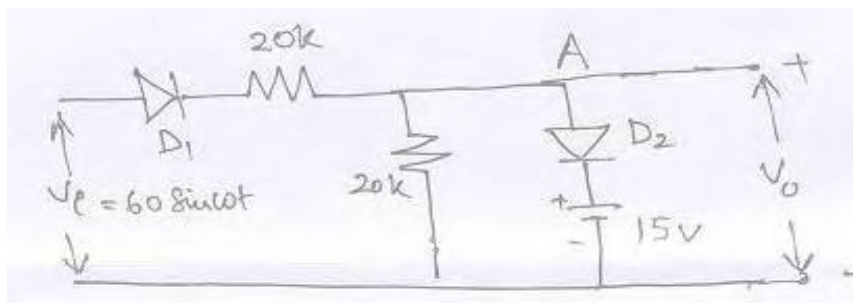


Figure 4:

- (b) Explain the phenomenon of 'Latching' in a transistor switch [8+8]
8. (a) What are the applications of sampling gates?
- (b) What are the advantages and disadvantages of unidirectional diode gate?
- (c) Discuss the operation of the four diode bi-directional sampling gate. [4+4+8]
