

Code No: NR/RR210202

NR/RR

Set No. 2

II B.Tech I Semester Examinations, November 2010

PULSE AND DIGITAL CIRCUITS

Common to Electronics And Computer Engineering, Electronics And
Telematics, Electronics And Communication Engineering, Electrical And
Electronics Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) Give the circuits of series clipper circuits and explain their operation with the help of transfer characteristics. [8]
- (b) For the circuit shown in the figure 8b : sketch the input and output waveforms if $R = 1 \text{ K}\Omega$ [8]

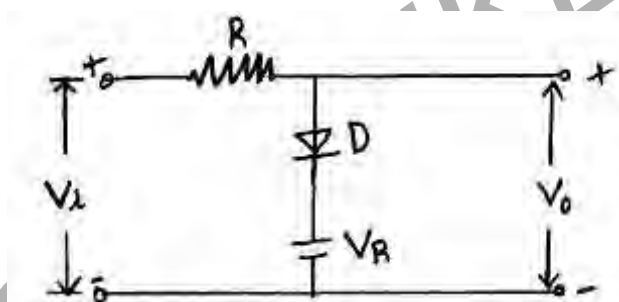


Figure 8b

$$V_R = 10 \text{ V}, V_i = 20 \sin \omega t$$

$$R_f = 100 \Omega, R_r = \infty$$

$$V_\gamma = 0$$

2. (a) Distinguish between logic gate and sampling gate. [4]
- (b) Why is a sampling referred as a linear gate? [4]
- (c) Illustrate the principle of operation of a linear gate using series switch and shunt switch. What are the disadvantages? [8]
3. Design a Schmitt trigger circuit using n-p-n silicon transistors to meet the following specifications:
 $V_{cc} = 12\text{V}$, $UTP = 4\text{V}$, $LTP = 2\text{V}$, $h_{fe} = 60$, $I_{c2} = 3\text{mA}$.
 Use relevant assumptions and the empirical relationships. [16]
4. (a) Define the terms:
 - i. Slope or sweep speed error and [6]
 - ii. Displacement error
- (b) An exponential sweep results when a capacitor is charged from a supply voltage V through a resistor R . If the peak sweep voltage is V_s , derive an expression for slope error (es). [10]

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5. (a) Explain the behavior of a BJT as a switch. Give Applications. [8]
 (b) Write a short note on switching times of a transistor. [8]
6. (a) Draw the block diagram and waveforms for a divider without phase jitter. [8]
 (b) Frequency division of 6:1 is obtained with an astable multivibrator negative pulses are applied to both bases of the n-p-n transistors. The OFF time of Q_1 is twice that of Q_2 . Sketch the wave shapes at B_1 and B_2 , showing superimposed pulses. [8]
7. (a) Verify $V_1 = \frac{V}{1+e^{-T/2RC}}$ $V_1' = \frac{V}{1+e^{T/2RC}}$ (figure 1a)

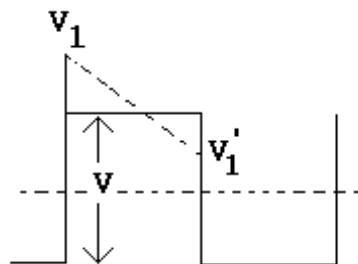


Figure 1a

For a symmetrical square wave applied to a high pass RC circuit.

- (b) Draw the RC high pass circuit and explain its working with step voltage input. [10+6]
8. (a) Compare the diode controlled and RC controlled astable operated blocking oscillator. [6]
 (b) What are the advantages of RC controlled oscillator? [4]
 (c) List the applications of blocking oscillators. [6]

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- (b) For the circuit shown in the figure 8b : sketch the input and output waveforms if $R = 1 \text{ K}\Omega$ [8]

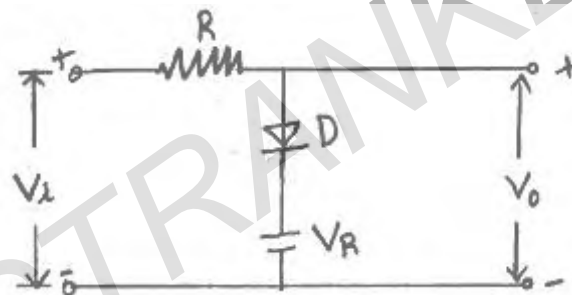


Figure 8b

$$V_R = 10 \text{ V}, V_i = 20 \sin \omega t$$

$$R_f = 100 \Omega, R_r = \infty$$

$$V_\gamma = 0$$

2. (a) Compare the diode controlled and RC controlled astable operated blocking oscillator. [6]
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3. (a) Draw the block diagram and waveforms for a divider without phase jitter. [8]
- (b) Frequency division of 6:1 is obtained with an astable multivibrator negative pulses are applied to both bases of the n-p-n transistors. The OFF time of Q_1 is twice that of Q_2 . Sketch the wave shapes at B_1 and B_2 , showing superimposed pulses. [8]
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 $V_{cc} = 12 \text{ V}$, $UTP = 4 \text{ V}$, $LTP = 2 \text{ V}$, $h_{fe} = 60$, $I_{c2} = 3 \text{ mA}$.
 Use relevant assumptions and the empirical relationships. [16]
5. (a) Define the terms:

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- i. Slope or sweep speed error and [6]
 ii. Displacement error
- (b) An exponential sweep results when a capacitor is charged from a supply voltage V through a resistor R . If the peak sweep voltage is V_s , derive an expression for slope error (es). [10]
6. (a) Verify $V_1 = \frac{V}{1+e^{-T/2RC}}$ $V_1' = \frac{V}{1+e^{T/2RC}}$ (figure 1a)

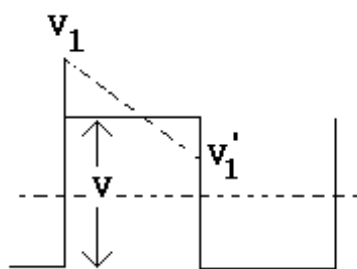


Figure 1a

For a symmetrical square wave applied to a high pass RC circuit.

- (b) Draw the RC high pass circuit and explain its working with step voltage input. [10+6]
7. (a) Distinguish between logic gate and sampling gate. [4]
 (b) Why is a sampling referred as a linear gate? [4]
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- Compare the diode controlled and RC controlled astable operated blocking oscillator. [6]
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- Design a Schmitt trigger circuit using n-p-n silicon transistors to meet the following specifications:
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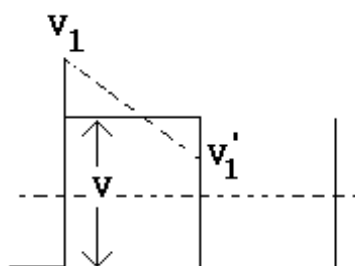


Figure 1a

For a symmetrical square wave applied to a high pass RC circuit.

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6. (a) Draw the block diagram and waveforms for a divider without phase jitter. [8]
 (b) Frequency division of 6:1 is obtained with an astable multivibrator negative pulses are applied to both bases of the n-p-n transistors. The OFF time of Q_1 is twice that of Q_2 . Sketch the wave shapes at B_1 and B_2 , showing superimposed pulses. [8]
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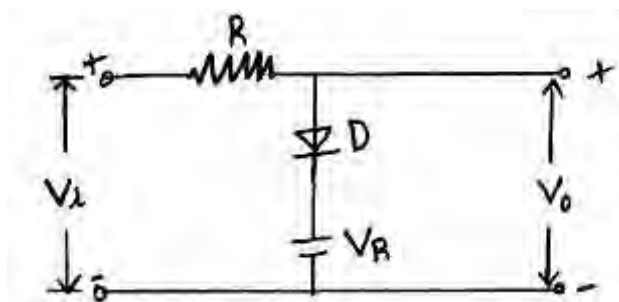


Figure 8b

$$V_R = 10 \text{ V}, V_i = 20 \sin \omega t$$

$$R_f = 100 \Omega, R_r = \infty$$

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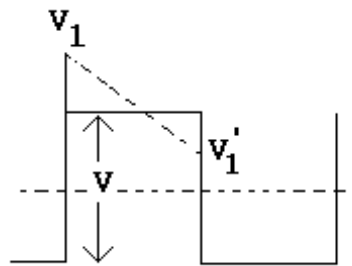


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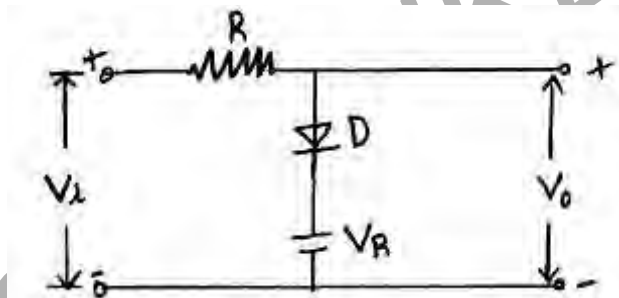


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