Code No: NR221003 **NR**

II B.Tech II Semester Supplementary Examinations, Nov/Dec 2005
PULSE & DIGITAL CIRCUITS
(Common to Electronics & Instrumentation Engineering and Electronics & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) The input to a high pass RC circuit is periodic and trapezoidal as indicated below. Assume that the time constant RC is large compared with either T_1 or T_2. Find and sketch the study state output if RC=$10T_1$=$10T_2$. (figure 1)

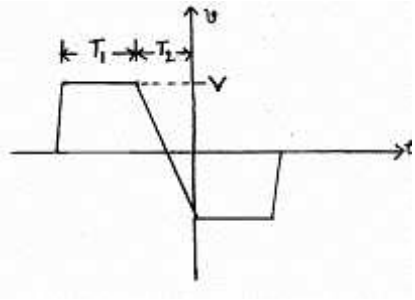

Figure 1:

[10]

(b) Derive the expression for percentage tilt P of a square wave output of a RC high pass circuit. [6]

2. (a) Discuss the effect of Diode characteristics on clamping voltage. [6]

(b) A symmetrical square wave of 100 Hz whose peak to peak amplitude is 20V is applied to the circuit shown in figure 2 below. Sketch the steady state output waveform indicating clearly the voltage levels and time constants. Assume that the diode has zero cut-in voltage, 100Ω forward resistance in infinite reverse resistance. [10]

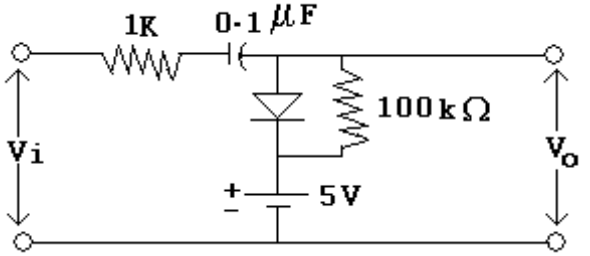

Figure 2:

3. (a) Explain how transistor can be used as a switch in the circuit, under what condition a transistor is said to be 'OFF' and 'ON' respectively. [6]

   (b) A germanium transistor is operated at room temperature in the CE configuration. The supply voltage is 6 V, the collector-circuit resistance is 200 Ω and the base current is 20 percent higher than the minimum value required to drive the transistor into saturation. Assume the following transistor parameters: I_{co}=-5μA, I_{EO}=-2μA, h_{FE}=100, and $r_{bb'}$=250 Ω. Find V_{BE}(Sat) and V_{CE}(Sat). [10]

4. (a) Draw the circuit diagram of an astable multi and explain its operation. [10]

   (b) A collector-coupled astable multi uses n-p-n transistors with h_{FE}(min)=30.The parameter values are:
   $R_1 = R_2$= 50 KΩ and $C_1 = C_2 = 0.1$ μF .
   Find the pulse width, period and frequency of the output. [6]

5. With reference to voltage sweeps explain the following terms: [16]

   (a) Sweep speed

   (b) Linearity of sweep

   (c) Sweep stability

   (d) Recovery time.

6. (a) How astable multivibrator can be synchronized? Illustrate with waveforms.[8]

   (b) A symmetrical astable multivibrator using transistor operates from 10V supply has a period of 1msec. Triggering pulses of spacing 750 microsec are applied to one base through a small capacitor from a high-impedance source. Find the minimum triggering pulse amplitude required to achieve 1:1 synchronization. [8]

7. (a) Explain the operation of multiple input unidirectional sampling gate using diodes. [6]

   (b) Illustrate with circuit diagram, the operation of the above with a number of control voltage inputs . [6]

   (c) Give an alternate circuit whose output is not sensitive to upper level of control voltage. [4]

8. Explain the recovery and loading considerations in blocking oscillator and the effect of providing damping. Give an alternate circuit to have pulse period independent of RL. [16]

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