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Total No. of Questions : 09] [Total No. of Pages : 03

J-1451 [6410 A] [2126]

B.Tech. (Semester - 5th)

PULSE AND DIGITAL SWITCHING CIRCUITS (EC - 309)

Time : 03 Hours Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **compulsory.**
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 x 2 = 20)*

a) What do you understand by an attenuator?

b) When does a high pass filter circuit acts as a differentiator?

c) Differentiate between perfect compensation, under compensation and over compensation.

d) What do you mean by non-regeneration comparator? Give an example.

e) What is the difference between clipping and clamping?

f) Define, (i) storage time of diode, (ii) transition time of diode.

g) Define critical, over and under damping in uncompensated wide band amplifier.

h) Why monostable multivibrator is called a delay circuit.

i) Elaborate low frequency compensation in amplifiers.

j) What do you mean by distributed amplifier?

Section - B

(4 x 5 = 20)

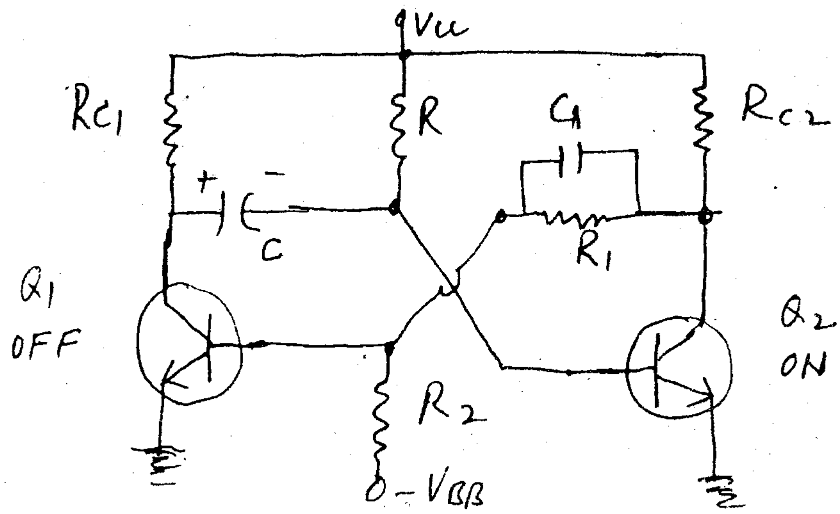
Q2) What is low pass RC circuit? Derive an expression of output voltage for square wave input and draw input-output characteristics of this circuit.

P.T.O.

Q3) Discuss in details transistor as a switch and what are the parameters taken into consideration to bias the transistor.

Q4) An ideal 1 μsec pulse from a pulse generator is fed to an amplifier. Calculate and plot the output waveform under the following condition. The upper 3 dB frequency is: (a) 10 MHz and, (b) 0.1 MHz. Rise time of capacitor = 2.2 RC.

Q5) Design a collector coupled one shot multivibrator circuit using n-p-n transistors. Neglect I_{CBO} and junction voltages of the transistor in saturation. Let h_{fe} (min.) = 20. In stable state, the OFF transistor has $V_{BE} = -1$ V. The ON transistor has base current I_B which is 50% in excess of the I_B(min) value. $V_{CC} = 8$ V, I_C(sat.) = 2mA, delay time = 2500 μsec. Chosen $R_1 = R_2$. I_{B2}(actual) = 1.5 I_{B2}(min.).



Q6) What do you mean by a clipper? Discuss in details diode as a clipper.

Section - C

(2 x 10 = 20)

Q7) Explain the working of a bistable multivibrator with the help of a neat circuit diagram and waveforms. Derive an expression for the frequency of this circuit.

Q8) (a) For a common emitter circuit, $V_{CC} = 15$ V, $R_C = 1.5$ kΩ and $I_B = 0.3$ mA.

(i) Determine the value of h_{fe}(min.) for saturation to occur.

(ii) If R_C is changed to 500 Ω, will the transistor be saturated?

(b) What is a Schmitt triggering? Explain the working of a Schmitt trigger with the help of a neat circuit diagram and waveforms.

Q9) (a) Design a diode clamper circuit to restore the bottom peaks of the input signal to zero level. Use a silicon diode with forward resistance, $R_f = 50\ \Omega$ and reverse resistance, $R_r = 400\ k\Omega$. The frequency of the input voltage signal is 5 kHz. Assume RC = 20 T.

(b) How frequency response of an amplifier varies with low and high frequency signals. Discuss step response of an amplifier.