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RN-6785

B. E. III (Sem. V) (ECC) Examination

May / June – 2010

Pulse & Switching Circuits

Time : **3** Hours] [Total Marks : **100**

Instruction :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. 3 (Sem. 5) (ECC)**

Name of the Subject :

☛ **Pulse & Switching Circuits**

☛ Subject Code No. : 6 7 8 5 ☛ Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

(2) Attempt **all** the questions.
(3) Assume data if **necessary**.
(4) Figures to the **right** indicate full marks.
(5) Answers to the two sections must be written in separate answer books.

SECTION - I

1 (a) Attempt the following : **10**

(i) The wave form which preserves its form when transmitted through a linear network is a:
  (a) Sine wave
  (b) Step signal
  (c) Impulse signal
  (d) Ramp Signal.

(ii) The lower cut off frequency of a low pass RC circuit is _____.

(iii) the rise time of the output of a low pass RC circuit is iven by _____.

(iv) If two stages with rise times tr1 and tr2 respectively, are connected in cascade the resultant rise time tr is given by:
  (a) tr = tr1 + tr2
  (b) tr = tr1 x tr2
  (c) tr = 1.05
  (d) tr = 2 $\sqrt{tr_1^2 + tr_2^2}$

(v) The condition for perfect compensation of an alternator is _____.

(vi) RL circuits are used when a large time constant is require (T/F)

(vii) In a clamping circuit the average level of the input does not play any part in determining the steady state o/p wave form (T/F)_____

(viii) Clipping circuits require nonlinear elements (T/F)

(ix) In a clamping circuit, the tilts in the forward (Df) and reverse (Dr) are related by

(x) In a clamping circuit, when there is distortion the relation AF/Ar = RF/R is not valid. (T/F)_____

(b) Derive an equation of percentage tilt for high pass RC network. **5**

(c) Explain the concept of an attenuator with its applications. **5**

2 Attempt any **two** : **16**

(i) The periodic ramp voltage shown in figure (1) is applied to a low pass RC circuit.

(a) Find the equations from which to determine the steady state output wave form.

(b) If T1 = T2 = RC, find the maximum and minimum values of the output voltage and plot the waveform.

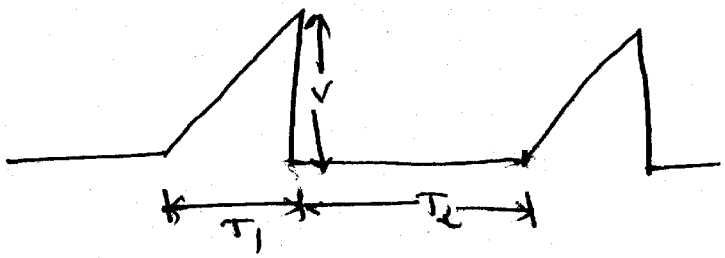


Fig. 1

(ii) For the clipping circuit shown in figure 2 make a plot of Vo versus Vin for the range of Vin from 0 to 50 V. Indicate all slopes and voltage levels. Also, indicate for each region, the diodes which conduct

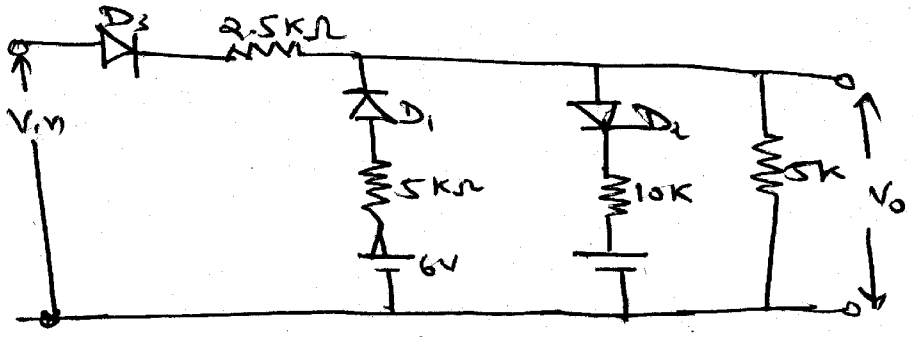


Fig. 2

(c) Explain the operation of transistor as a clipper and derive the necessary equation for the same.

3 Attempt any **two** : 14

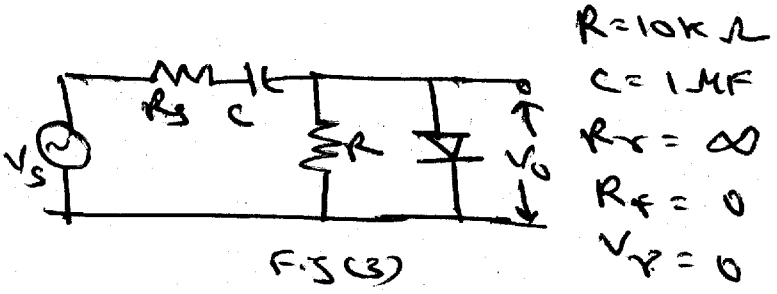
(i) Explain the concept of differentiation and double differentiation.

(ii) A symmetrical 10 kHz square wave whose peak-to-peak excursions are ± 10V with respect to ground is applied to the clamping circuit of figure (3) for the same

(a) Sketch the output wave form

(b) If the diode forward resistance is 1 KΩ sketch the output waveform

(c) Repeat part (b) if the source impedence is 1 KΩ



(3) An unsymmetrical square wave with T_1 = 1 ms and T_2 = 1 µs has an amplitude of 20 V. This signal is applied to the clamping circuit of fig 3 in which R_F = 100 Ω R = 100 KΩ and R_s = 0. Assume that capacitor is arbitrariy arge so that the output is a square wave without tilt. For the same

(a) Find where the zero level location on the waveform is located

(b) If the waveform is inverted so that T_1 = 1 µs and T_2 = 1 ms find location of the zero level.

SECTION - II

4 (a) Answer the following : 10

(i) During a transition, the loop gain is _____.

(ii) The loop gain will be _____ if either of the two devices is below cut off or if either device is an saturation.

(iii) _____ multivibrator is used as a delay circuit and as a gating circuit.

(iv) Synchronization may be on a _____ basis or maybe with _____.

(v) The _____ multivibrator is used as a master oscillator.
(vi) For a Schmitt trigger _____ is defined as the i/p voltage at which Q1 starts conducting.
(vii) _____ reduces o/p swing
(viii) The interval during which conduction transfer from one transistor to another is called the _____.
(ix) A circuit which has got one permanent stable state and one quasi stable state is called a _____.
(x) _____ multivibrator can be used as a voltage to frequency converter.

(b) Explain non-saturating binary. **5**

(c) Explain triggering symmetrically through unilateral diode. **5**

5 (a) Explain the emitter coupled binary with the use of waveform for different loop gain and also explain hysteresis. **8**

(b) Calculate the component values of a monostable multivibrator developing an output pulse of 500 µs duration. Assume h_{FE} (min) = 25, I_{CE} (sat) = 5mA, V_{CC} = 10V and V_{BB} = –4V. **7**

OR

5 (a) Derive the expression for UTP and LTP for emitter coupled binary. **8**

(b) Silicon NPN transistors with h_{FE} (min) = 50 are available. Design an astable multivibrator to generate a square wave of 2 KHz frequency with a duty cycle of 25%. **7**

6 Write short notes on following (any **three**) **15**

(i) Schmitt trigger as a squaring circuit
(ii) Fixed bias bistable multivbirator
(iii) Types of triggering in a binary
(iv) Miller sweep generator circuit
(v) Commutating capacitors.