

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 3004

Roll No.

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B.Tech.

FIFTH SEMESTER EXAMINATION, 2004-2005

DIGITAL INTERGRATED CIRCUITS

Time : 3 Hours

Total Marks : 100

Note : (i) Attempt **ALL** the questions.

(ii) Attempt any two parts

1. Answer **any two** parts of the following :

[10x2=20]

- (a) A symmetrical square of peak to peak amplitude V and frequency f is applied to a high pass RC circuit. Show that the percentage tilt is given by

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

- (b) An ideal 1μ sec pulse is fed to an amplifier. Calculate and plot the output waveform under following conditions: the upper 3dB frequency is

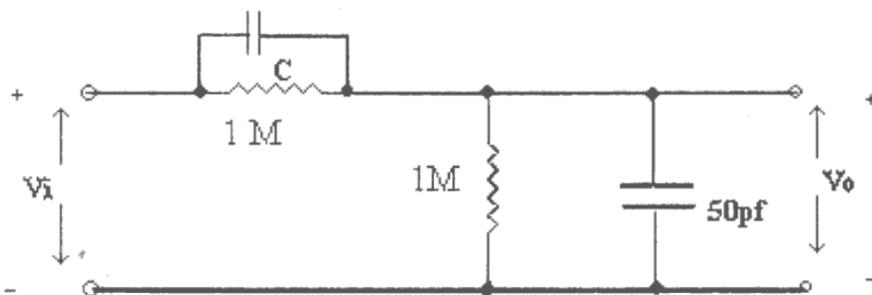
(a) 10 MHz

(b) 0.1 MHz.

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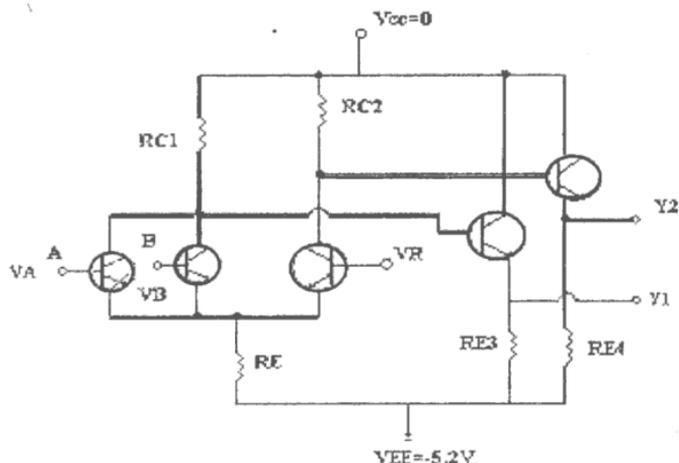
- (a) Complete and draw to scale the output waveform for $C=50\text{pf}$ and $C=25\text{pf}$. The input is a 20 V Step.



Answer *any two* parts of the following :

[10x2=20]

- (a) Sketch the standard TTL NAND gate and explain the operation. Also give the reason of diode at output between Q_3 and Q_4 . What will happen if two totem pole output are tied together to get wired logic output.
- (b) Compare TTL, ECL, CMOS and RTL on basis of noise margin, packing density, power consumption and gate delay.
- (c) Considering the following circuit determine the logic level and the reference voltage using $R_{C1}=270\Omega$ and $R_{C2}=300\Omega$, $R_E=1.24\text{K}\Omega$, $R_{E3}=R_{E4}=2\text{K}\Omega$



3. Answer *any two* parts of the following : [10x2=20]

- (a) Sketch 8 bit serial in serial out shift register using S R flip flop. What will be content of shift register after 13 clock pulses for following data steam.

Data steam=83 ACF

How can above shift register can be converted to Johnson counter ?

- (b) What are programmable counters. Explain how programmable counter can be programmed to run between state four and thirteen (consider 4 bit programmable counter 74193).
- (c) Design and implement a sequence generator for following sequence. What do you mean by Random square and pseudo random sequence.

S=1 000 1 00 11 010 111.

4. Answer *any two* parts of the following : [10x2=20]

- (a) Draw the basic bipolar RAM cell and explain read and write operation. How basic RAM are organized?
- (b) Write short notes on
- | | |
|--------------|-------------------|
| (i) PROM | (ii) EPROM |
| (iii) EEPROM | (iv) Flash Memory |
- (c) Design a traffic light Controller such that green light remains ON for 60 seconds and red light remains On for 30 seconds.

5. Answer *any two* parts of the following : [10x2=20]

(a) Implement the full subtractor using the PAL

(b) Write a short note on

(i) GaAs based circuit

(ii) BiCMOS circuit

(b) (i) What is the difference between PLA and PAL devices ?

(ii) Draw the BiCMOS2 input NAND and NOR gates. Also verify the truth table of respective gates.

