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10AL51

Fifth Semester B.E. Degree Examination, June/July 2017
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – A

1 a. Define Management with list and explain the functions of Management. **(10 Marks)**
b. "Manager plays a vital role in an organization". Justify this statement with reference to Interpersonal, Decision and Informational roles. **(10 Marks)**

2 a. State and explain importance of planning process. **(10 Marks)**
b. Elucidate on steps in Decision making with probable difficulties faced by Manager. **(10 Marks)**

3 a. What are Committees? Explain the principles of committees. **(10 Marks)**
b. Explain techniques of selection in detail. **(10 Marks)**

4 a. Define Motivation. Mention characteristics and anticipated results of motivation. **(10 Marks)**
b. Describe essentials of Sound control system. **(10 Marks)**

PART – B

5 a. Briefly describe Entrepreneurship and list out types of Entrepreneurs. **(10 Marks)**
b. Enumerate on barriers faced by Women Entrepreneurs. **(10 Marks)**

6 a. Describe Small Scale industry, Ancillary industry and Tiny industry. **(10 Marks)**
b. Explain the impact of Liberalization , Privatization and Globalization on small scale industry. **(10 Marks)**

7 a. Describe Single Window concept. **(05 Marks)**
b. Enumerate on functions of SISI. **(05 Marks)**
c. Explain the role of KSFC in setting up industries. **(05 Marks)**
d. Write on objectives of NSIC. **(05 Marks)**

8 a. Explain the process of product identification and project selection. **(10 Marks)**
b. Discuss on essentials of project appraisal. **(10 Marks)**

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Fifth Semester B.E. Degree Examination, June/July 2017
Digital Signal Processing

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of Butterworth table is permitted.***

PART – A

1 a. Define DFT. Establish the relation between DTFT and DFT. **(04 Marks)**

b. Find the 5-point DFT of $x(n) = \{1, 2, 3, 1\}$. And also draw magnitude and phase plots. **(08 Marks)**

c. Find the IDFT for the sequence; $x(K) = [5, 0, (1 - j), 0, 1, 0, (1 + j), 0]$ **(08 Marks)**

2 a. State and prove the following properties of DFT's
(i) Circular time shift.
(ii) Circular convolution in time. **(08 Marks)**

b. For the sequences, $x_1(n) = \cos\left(\frac{2\pi}{4}\right)n$, $x_2(n) = \sin\left(\frac{2\pi}{4}\right)n$, $0 \le n \le 3$. Find $x_1(n) Ⓝ x_2(n)$ using DFT and IDFT. **(07 Marks)**

c. Consider the sequence, $x(n) = [4\delta(n) + 3\delta(n-1) + 2\delta(n-2) + \delta(n-3)]$. Let X(K) be the six point DFT of x(n), find the finite length sequence y(n) that has six point DFT, $Y(K) = W_6^{4K} X(K)$. **(05 Marks)**

3 a. A long sequence x(n) is filtered through a filter with a impulse response h(n) to yield the output y(n).
If x(n) = [1, 4, 3, 0, 7, 4, -7, -7, -1, 3, 4, 3] and h(n) =[1, 2]. Compute y(n) using overlap add technique. **(08 Marks)**

b. Develop the DIF-FFT algorithm for N = 8. Using the resulting signal flow graph. Compute the 8-point DFT of the sequence $x(n) = \sin\left(\frac{\pi}{2}n\right)$ $0 \le n \le 7$. **(12 Marks)**

4 a. Determine the IDFT of X(K) = [4, 1-j2.414, 0, 1-j0.414, 0, 1+j0.414, 0, 1+j2.414]. Using inverse-Radix-2 DIT-FFT algorithm. **(10 Marks)**

b. What are chirp signals? What are the applications of chirp-Z transform? **(04 Marks)**

c. Write a note on Goertzel algorithm. **(06 Marks)**

PART – B

5 a. A Butterworth lowpass filter has to meet the following specifications:
(i) Passband gain, Kp = -1 dB at $\Omega_P = 4$ rad/sec.
(ii) Stopband attenuation greater than or equal to 20 dB at $\Omega_S = 8$ rad/sec.
Determine the transfer function $H_a(s)$. **(12 Marks)**

b. Explain analog-to-analog frequency transformation. **(08 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

6 a. Explain the structures used for realizing FIR filters by illustrations. **(10 Marks)**

b. Realize the system function,

$$H(z) = \frac{1}{2} + \frac{1}{3}z^{-1} + z^{-2} + \frac{1}{4}z^{-3} + z^{-4} + \frac{1}{3}z^{-5} + \frac{1}{2}z^{-6}$$

using linear phase. **(04 Marks)**

c. Obtain the cascade form realization for the given difference equation.

$$y(n) = -\frac{3}{4}y(n-1) - \frac{1}{8}y(n-2) + x(n) + \frac{1}{3}x(n-1)$$

Also, draw the signal flow graph. **(06 Marks)**

7 a. A filter has to be designed with the following desired frequency response:

$$H_d(W) = \begin{cases} 0, & -\frac{\pi}{4} < |\omega| < \frac{\pi}{4} \\ e^{-\rho 2\omega}, & \frac{\pi}{4} < |\omega| < \pi \end{cases}$$

Find the frequency response of the FIR filter designed using a rectangle window defined below.

$$W_R(n) = \begin{cases} 1, & 0 \le n \le 4 \\ 0, & \text{Otherwise} \end{cases}$$

(12 Marks)

b. List the steps in the design procedure of a FIR filter using window functions. **(05 Marks)**

c. List the advantages of a FIR filter. **(03 Marks)**

8 a. Derive mapping function used in transforming analog filter to digital filter by bilinear transformation preserves the frequency selectivity and stability properties of analog filter. **(12 Marks)**

b. Transform the analog filter,

$$H_a(s) = \frac{(s+1)}{s^2 + 5s + 6}$$ into H(z) using impulse invariant transformation. Take T = 0.1 sec. **(08 Marks)**

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Fifth Semester B.E. Degree Examination, June/July 2017
Analog Communication

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define Mean, Correlation and Covariance functions. **(06 Marks)**

b. A random variable has a probability density function

$$f_X(x) = \begin{cases} \frac{5}{4}(1-x^4) , & 0 \le x \le 1 \\ 0 & \text{elsewhere} \end{cases}$$

Find i) $E(x)$ ii) $E(4x+2)$ and iii) $E(x^2)$. **(06 Marks)**

c. Define Power Spectral Density. Explain the properties of Power Spectral Density. **(08 Marks)**

2 a. Explain the generation of A.M. using a Switching Modulator with equations. **(08 Marks)**

b. A sinusoidal carrier is amplitude modulated by a square wave that has zero DC component and peak – to – peak value of 2V. The period of the square wave is 0.5 rms. The carrier amplitude is 3V(peak) and carrier frequency is 10kHz. Find the modulation index for the modulated wave and sketch all the signals. **(05 Marks)**

c. With the help of a neat diagram, explain the working of costas loop. **(07 Marks)**

3 a. Explain the concept of Pre - envelopes. Obtain the Hilbert Transform of the following function $x(t) = \sin 2\pi ft$. **(07 Marks)**

b. With the block diagram, explain the phase discrimination method of generation of SSB wave consisting of only USB signals. **(07 Marks)**

c. For the AM signal $s(t) = A_c \cos[2\pi f_c t + \phi(t)]m(t)$, find the following :
i) Pre-envelope ii) Complex envelope iii) Natural envelope iv) In-phase – quadrature components. **(06 Marks)**

4 a. Explain the Envelop detection of VSB wave plus carrier with relevant mathematical equations. **(06 Marks)**

b. Show that a VSB of LSB is defined by $s(t) = \frac{Ac}{2} m_I(t) \cos(w_c t) - \frac{Ac}{2} m_Q(t) \sin(w_c t)$. **(06 Marks)**

c. With Spectrum diagram, explain the operation of frequency translation. **(08 Marks)**

PART – B

5 a. Give comparison between Narrowband F.M and Wideband F.M. Define Carson's rule. **(08 Marks)**

b. Explain the generation of wideband F.M using Armstrong method. **(08 Marks)**

c. For a FM wave represented by the voltage equation $V = [12\sin(6 \times 10^8 t + 5 \sin 1250t)]$. Find the carrier modulating frequencies, β and maximum deviation. **(04 Marks)**

6 a. Explain demodulation of FM using phase locked loop non – linear model. **(10 Marks)**
b. With the block diagram, explain the operation of FM stereo multiplexing and stereo demultiplexing concept. **(10 Marks)**

7 a. Explain different types of noise with mathematical equations. **(06 Marks)**
b. Derive Frii's formula for Amplifiers connected in cascade with noisy networks. **(10 Marks)**
c. Calculate the Equivalent Input noise of an amplifier, having a noise figure of 13dB and has a bandwidth of 2 MHz. **(04 Marks)**

8 a. Derive the expression for figure of merit for Noise in AM receivers. **(10 Marks)**
b. Describe the pre – emphasis and de-emphasis in the F.M. **(10 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, June/July 2017

Microwaves and Radar

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Usage of Smith chart is permitted.***

PART – A

1 a. Define standing wave ratio. Why the high value of SWR is undesirable? **(05 Marks)**

b. Deduce the expression for reflection co-efficient when the transmission line is terminated by load impedance (Z_L). **(08 Marks)**

c. A transmission line of 100m length and a characteristic impedance of 100 ohms is terminated by a load Z_L = 100 – j200 ohms. Using the Smith chart, determine the line impedance and also admittance at 25m from the load end at a frequency of 10MHz. **(07 Marks)**

2 a. What are microwave isolators? Explain the operation of a Faraday rotation ferrite isolator. List applications of an isolator. **(10 Marks)**

b. What are cavity resonators? What applications do they have? **(05 Marks)**

c. With the aid of neat sketch, explain the operation of a two-hole wave guide directional coupler. **(05 Marks)**

3 a. With the aid of energy band diagram, explain two-valley model theory for Gunn diodes. **(07 Marks)**

b. A typical n-type GaAs Gunn diode has the following parameters :

Threshold field E_{th} = 2800V/cm
Applied field E = 3200V/cm
Device length L = 10 μm
Doping concentration n_0 = 2×10^{14} cm^{-3}
Operating frequency f = 10 GHz

i) Compute the electron drift velocity
ii) Calculate the current density
iii) Estimate the negative electron mobility **(06 Marks)**

c. Draw the schematic of an IMPATT diode and explain the its operation. **(07 Marks)**

4 a. What are S – parameters of two part network? Why these parameters are preferred to Z and Y parameters for operation in microwave frequencies? **(08 Marks)**

b. State the properties of S – parameters. Prove the unitary property of S – parameters. **(08 Marks)**

c. Write the S – matrix for E – plane Tee. **(04 Marks)**

PART – B

5 Write note on :

a. Hybrid – Tee and its applications **(08 Marks)**

b. Mircrowave attenuator **(05 Marks)**

c. Coaxial connectors **(07 Marks)**

6 a. A lossless parallel strip line has a conducting strip width W. The substrate dielectric separating the two conducting strips has a relative dielectric constant $\in_{rd}$ of 6 (Beryllium oxide Beo) and a thickness d of 4mm.

Compute :

i) The required width 'W' of the conducting strip in order to have a characteristic impedance of 50Ω

ii) The strip line capacitance

iii) The strip line inductance

iv) The phase velocity of the wave in the parallel strip line. **(08 Marks)**

b. What are the advantages of coplanar strip lines over parallel strip lines? **(05 Marks)**

c. Derive the expression for attenuation constants for the conductor and dielectric losses of a parallel strip line at microwave frequencies. **(07 Marks)**

7 a. Derive the radar range equation as governed by the minimum receivable echo power. **(08 Marks)**

b. List the applications of Radar. **(05 Marks)**

c. Draw a functional block diagram of a pulsed radar- and describe the function of each block. **(07 Marks)**

8 a. With the aid of neat block diagram, explain the operation of an MTI system. **(08 Marks)**

b. What is blind speed? **(05 Marks)**

c. Describe digital MTI system. **(07 Marks)**

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Fifth Semester B.E. Degree Examination, June/July 2017
Information Theory & Coding

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. A black and white TV picture consists of 525 lines of picture information. Assume that each line consists of 525 picture elements (pixels) and that each element can have 256 brightness levels. Picture are repeated at the rate of 30 frames/sec. calculate the average rate of information conveyed by a TV set to a viewer. **(04 Marks)**

b. Obtain an expression for maximum entropy of a system. **(06 Marks)**

c. Design a system to report the heading of a collection of 400 cars. The heading levels are : heading straight (S), turning left (L) and turning right (R). This information is to be transmitted every second. Construct a model based on the test data given below.

(i) On the average during a given reporting interval, 200 cars were heading straight, 100 were turning left and remaining were turning right.

(ii) Out of 200 cars that reported heading straight, 100 of them reported going straight during the next reporting period, 50 of them turning left and remaining turning right during the next period.

(iii) Out of 100 cars that reported as turning during a signaling period, 50 of them continued their turn and remaining headed straight during the next reporting period.

(iv) The dynamics of the cars did not allow them to change their heading from left to right or right to left during subsequent reporting periods.

- Find the entropy of each state.
- Find the entropy of the system.
- Find the rate of transmission. **(10 Marks)**

2 a. The source emits the messages consisting of two symbols each. These messages and their probabilities are given in Table 1. Design the source encoder using Shannon's encoding algorithm and also find encoder efficiency. **(10 Marks)**

Table 1

Message M_i	AA	AC	CC	CB	CA	BC	BB
Probability P_i	$\frac{9}{32}$	$\frac{3}{32}$	$\frac{1}{16}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{3}{32}$	$\frac{9}{32}$

b. Find the minimum number of symbols, 'r' in the coding alphabet for devising an instantaneous code such that W = {0, 5, 0, 5, 5}. Devise such a code (Note: W represents the set of the code words of length 1, 2, 3, ...) **(10 Marks)**

3 a. A non-symmetric binary channel is shown in Fig.Q3 (a),

i) Find H(X), H(Y), $H\left(\frac{X}{Y}\right)$ and $H\left(\frac{Y}{X}\right)$ given $P(X = 0) = \frac{1}{4}$, $P(X = 1) = \frac{3}{4}$, $\alpha = 0.75$, $\beta = 0.9$

ii) Find the capacity of the binary symmetric channel if $\alpha = \beta = 0.75$ **(10 Marks)**

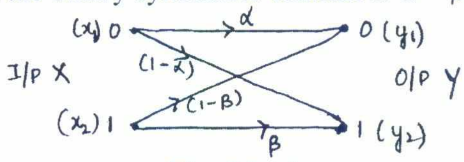

Fig. Q3 (a)

b. What is the entropy (η) of the image below, where numbers (0, 20, 50, 99) denote the gray level intensities? **(10 Marks)**

99	99	99	99	99	99	99	99
20	20	20	20	20	20	20	20
0	0	0	0	0	0	0	0
0	0	50	50	50	50	0	0
0	0	50	50	50	50	0	0
0	0	50	50	50	50	0	0
0	0	50	50	50	50	0	0
0	0	0	0	0	0	0	0

ii) Show step by step how to construct the Huffman tree to encode the above four intensity values in this image. Show the resulting code for each intensity value.
iii) What is the average number of bits needed for each pixel, using Huffman code?

4 a. State Shannon-Hartley law. Derive an expression for the upper limit on channel capacity as the bandwidth tends to infinity. **(10 Marks)**

b. An analog signal has a 4 kHz bandwidth. The signal is sampled at 2.5 times the Nyquist rate and each sample quantized into 256 equally likely levels. Assume that the successive samples are statistically independent.
i) Find the information rate of this source.
ii) Can the output of this source be transmitted without errors over a Gaussian channel of bandwidth 50 kHz and (S/N) ratio of 20 dB?
iii) If the output of this source is to be transmitted without errors over an analog channel having (S/N) of 10 dB, compute the bandwidth requirement of the channel. **(10 Marks)**

PART – B

5 a. The parity check bits of a (7, 4) Hamming code are generated by,

$C_5 = d_1 + d_3 + d_4$

$C_6 = d_1 + d_2 + d_3$

$C_7 = d_2 + d_3 + d_4$

where d_1, d_2, d_3 and d_4 are the message bits.
i) Find the generator matrix [G] and parity check matrix [H] for this code.
ii) Prove that $GH^T = 0$.
iii) The (n, K) linear block code so obtained has a "dual" code. This dual code is a (n, n-K) code having a generator matrix H and parity check matrix G. Determine the eight code – vectors of the "dual code" for the (7, 4) Hamming code described above.
iv) Find the minimum distance of the dual code determined in part (iii). **(10 Marks)**

b. Design (n, K) Hamming code with a minimum distance of $d_{min} = 3$ and a message length of 4 bits. If the received code vector is R = [1 1 1 1 0 0 1]. Detect and correct the single error that has occurred due to noise. **(10 Marks)**

6 a. The expurgated (n, K-1) Hamming code is obtained from the original (n, K) Hamming code by discarding some of the code vectors. Let g(x) denote the generator polynomial of the original hamming code. The most common expurgated hamming code is the one generated by $g_1(x) = (1+x)g(x)$; where (1+x) is a factor of $1+x^n$. Consider the (7, 4) Hamming code generated by $g(x) = 1 + x^2 + x^3$,

(i) Construct the eight code vectors in the expurgated (7, 3) Hamming code, assuming a systematic format. Hence, show that the minimum distance of the code is 4.

(ii) Determine the generator matrix G_1 and the parity check matrix H_1 of the expurgated hamming code.

(iii) Devise the encoder for the expurgated hamming code and list the shift register contents in a tabular fashion for the message 011. Verify the code-vector so obtained using $[V] = [D][G_1]$.

(iv) Devise the syndrome calculator for the expurgated hamming code. Hence, determine the syndrome for the received vector 0111110. Also correct the error, if any, in that received vector. **(14 Marks)**

b. The generator polynomial for (15, 7) cyclic code is $g(x) = 1 + x^4 + x^6 + x^7 + x^8$

(i) Find the code-vector in systematic form for the message $D(x) = x^2 + x^3 + x^4$.

(ii) Assume that the first and last bit of the code-vector V(x) for $D(x) = x^2 + x^3 + x^4$ suffer transmission errors. Find the syndrome of V(x). **(06 Marks)**

7 a. Consider the binary convolutional encoder shown in Fig. Q7 (a). Draw the state table, state transition table, state diagram and the corresponding code tree. Using the code tree, find the encoded sequence for the message (1 0 1 1 1). Verify the output sequence so obtained using transform domain approach. **(10 Marks)**

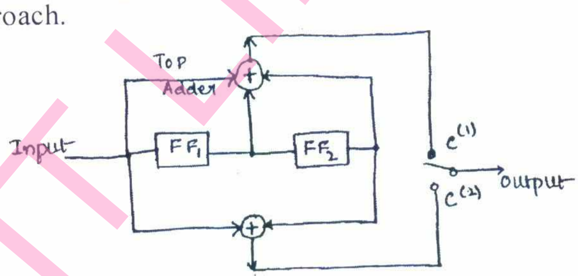

Fig. Q7 (a)

b. Consider the (3, 1, 2) convolutional code with $g^{(1)} = (1\ 1\ 0)$, $g^{(2)} = (1\ 0\ 1)$ and $g^{(3)} = (1\ 1\ 1)$.

(i) Draw the encoder block diagram.

(ii) Find the generator matrix.

(iii) Find the code-word corresponding to the information sequence (1 1 1 0 1) using time-domain and transform-domain approach. **(10 Marks)**

8 Write short notes on the following:

a. RS codes.

b. Golay codes.

c. BCH codes.

d. Burst error correcting codes. **(20 Marks)**

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Fifth Semester B.E. Degree Examination, June/July 2017
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Describe in detail the step-by-step procedure involved in the fabrication of nMOS. **(08 Marks)**

b. Calculate the threshold voltage with $\epsilon_{si} = 11.7\,\epsilon_0$, $\epsilon_{ox} = 3.9\,\epsilon_0$ for an nMOS transistor with $Q_{fc} = 0$, $N_i = 1.45 \times 10^{10}/cm^3$, $N_A = 5\times10^{17}/cm^3$, $t_{ox} = 150\,\text{Å}$ and $\phi_{ms} = -0.9V$ using the equation $V_t = V_{tmos} + V_{fb}$. Plot the graph of 'V_t' versus 't_{ox}' for t_{ox} ranging from 50 Å to 300 Å and interpret the graph. **(06 Marks)**

c. With the truth table, draw the schematic for 2:1 MUX and 2-input XOR gate using transmission gate. **(06 Marks)**

2 a. List the colour, stick encoding, mask layout encoding for n-diffusion, p-diffusion, polysilicon metal 1 and metal 2. **(07 Marks)**

b. Draw the circuit and stick diagram for one-bit CMOS shift register. **(06 Marks)**

c. Draw the optimum layout of CMOS inverter whose $\left(\frac{W_p}{W_n}\right) = \frac{4}{2}$ by stitching the source and drain regions of 2:1 inverter with the contacts and metal. Discuss the merits of such design. Given $L_p = L_n = 1$. [Hint : Placing the transistor back to back]. **(07 Marks)**

3 a. Write the voltage-current equations for nMOS and pMOS transistor, with V-I characteristics discuss channel length modulation. **(08 Marks)**

b. Realize the boolean equation using CMOS and C²MOS logic $Z = \overline{A(B+C)+DE}$ **(06 Marks)**

c. Discuss BiCOMS logic and CMOS domino logic with relevant schematic. **(06 Marks)**

4 a. Discuss the limits of scaling

i) Substrate doping

ii) Limits on miniaturization

iii) Limits on interconnect and contact resistance. **(06 Marks)**

b. Describe the possible effect of propogation delay in cascaded pass transistors and long polysilicon wires. **(06 Marks)**

c. Calculate the area capacitance of a multilayer structure shown in Fig Q4(a), if feature size = 5 μm and relative value of metal to substrate = 0.075, polysilicon = 0.1, diffusion = 0.25. **(08 Marks)**

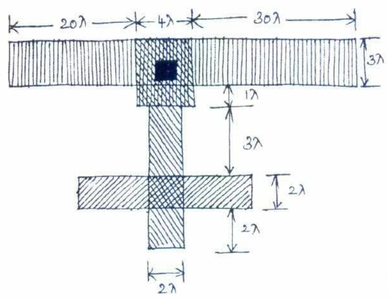

Fig 4(c)

PART – B

5 a. Discuss the architectural issues to be followed in the design of a VLSI subsystem. **(08 Marks)**

b. Show an arrangement to generate any logic function of two variable (A, B) by programming the inputs $I_0 - I_3$ appropriately with 0's and 1's using 4-way multiplexer. **(08 Marks)**

c. Define Metastability. Find the MTBU (t_f) of a system given f_c = 50MHz, f_d = 100KHz, t_f = 10ns, T_0 = 0.1s, τ_r = 0.2ns using the equation MTBU (t_f) = $\dfrac{1}{f_c f_d T_o e^{\frac{-t_f}{\tau_r}}}$. **(04 Marks)**

6 a. Design a 4-bit serial-parallel multiplier. **(10 Marks)**

b. Derive carry look – ahead adder equations and design a 4-bit CLA adder with a combination of ripple-through, given the following equation for carry and sum is

$C_k = A_k \cdot B_k + (A_k + B_K) C_{k-1}$

$S_k = A_k \cdot B_k + B_k \cdot C_k + C_k \cdot A_k$

Where A, B, C are input variables and K = {0, 1, 2, . . . n-1}. **(10 Marks)**

7 a. Discuss the various system timing considerations. **(06 Marks)**

b. Describe the working of CMOS pseudo static RAM cell. Determine the area requirement, estimated dissipation per bit stored and volatility of the same. **(08 Marks)**

c. Draw the schematic of 6-transistor SRAM cell. Discuss read 'O' and write 'O' operations with appropriate schematic diagrams. **(06 Marks)**

8 a. Mention the types of I/O pads and discuss their functionalities. **(08 Marks)**

b. Discuss noise margin in CMOs technology for a cascaded inverters (set of 2). Draw the noise margin graphs indicating NM_H, NM_L, V_{OH}, V_{IL}, V_{OL} and V_{IH} **(08 Marks)**

c. From the Figure Q 8(c) shown below, identify appropriate widths for nMOS and pMOS transistors to obtain optimum delay and area. **(04 Marks)**

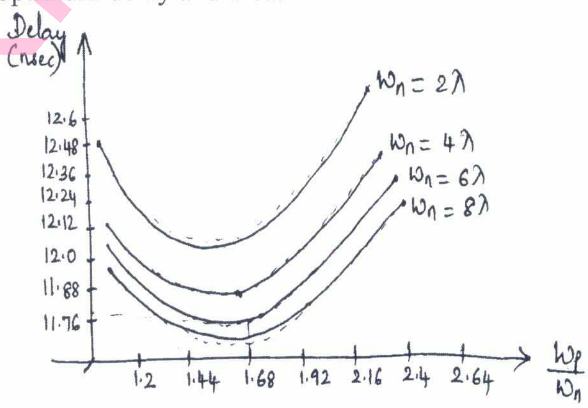

Fig Q8(c)

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