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10AL51

Fifth Semester B.E. Degree Examination, June/July 2019
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define term 'Management'? Explain its functions. **(05 Marks)**
b. List various contributions made by F.W. Taylor in the field of scientific management. **(05 Marks)**
c. List and explain "Roles of Manger"? **(10 Marks)**

2 a. List importance and purpose of planning process. **(05 Marks)**
b. Distinguish between strategic planning and tactical planning. **(05 Marks)**
c. Explain various steps involved in planning. **(10 Marks)**

3 a. What is 'Span of Management'? Explain various factors governing it. **(10 Marks)**
b. List and explain various principles of organization. **(10 Marks)**

4 a. What is meant by 'co-ordination', and explain requirements for excellent co-ordination. **(10 Marks)**
b. Explain by listing 'essentials of effective control system'. **(10 Marks)**

PART – B

5 a. List and explain various characteristics of an Entrepreneur. **(10 Marks)**
b. What are the roles of an entrepreneur in Economic development? **(10 Marks)**

6 a. Explain various steps involved in starting a 'small scale industry'. **(10 Marks)**
b. Explain how Govt. of India supported SSI through its five year plan. **(10 Marks)**

7 a. Under what context DIC's were established and what are the assistances it extends to SSI's. **(10 Marks)**
b. How TECSOK assist to start up and existing units and what assignment it undertakes. **(10 Marks)**

8 a. What is project Report and its significance? **(05 Marks)**
b. List Technical Analysis in project feasibility study. **(05 Marks)**
c. On what factors a project report to start an SSI is prepared, briefly explain. **(10 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, June/July 2019

Digital Signal Processing

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. ***Use of normalized filter tables not permitted.***

PART – A

1 a. Find N-point DFT of

(i) $x(n) = \delta(n)$ (ii) $x(n) = \cos\left(\frac{2\pi}{N} Kon\right)$ **(06 Marks)**

b. Define DFT. Derive the relationship of DFT to the Z-transform. **(06 Marks)**

c. Find 8-point DFT of $x(n) = \delta(n) + \delta(n-1) + \delta(n-2)$ and hence sketch magnitude and phase plot. **(08 Marks)**

2 a. State and prove the following properties of DFT:
i) Circular time shift
ii) Circular convolution **(06 Marks)**

b. Given $x(n) = [1, 2, 3, 4]$ and $h(n) = [1, 2, 2]$, compute
i) circular convolution
ii) linear convolution
iii) linear convolution using circular convolution.
Comment on the result. **(08 Marks)**

c. Determine N-point circular correlation of $x_1(n) = \cos\left(\frac{2\pi n}{N}\right)$ and $x_2(n) = \sin\left(\frac{2\pi n}{N}\right)$. **(06 Marks)**

3 a. Find the output y(n) of a filter whose impulse response is $h(n) = \{1, 2\}$ and the input signal to the filter is $x(n) = \{1, 2, -1, 2, 3, -2, -3, -1, 1, 1, 2, -1\}$ using overlap save method. **(10 Marks)**

b. Prove symmetry and periodicity property of twiddle factor. **(04 Marks)**

c. What are FFT algorithms? Compute number of complex multiplications, complex additions, real multiplications, real additions required to compute 1024 point DFT using direct DFT computation and FFT algorithms. **(06 Marks)**

4 a. Derive the Radix-2 DITFFT algorithm to compute 8-point DFT of a sequence, and draw the complete signal flow graph. **(12 Marks)**

b. Compute 8-point DFT of a sequence $x(n) = \left\{\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 0, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}\right\}$ using DIFFFT algorithm. **(08 Marks)**

PART – B

5 a. Derive an expression for order and cutoff frequency of Butterworth analog lowpass filter. **(06 Marks)**

b. Design an analog Butterworth LPF that has a gain of –2 dB at 20 rad/sec and attenuation in excess of –10 dB beyond 30 rad/sec. **(10 Marks)**

c. Compare Butterworth and Chebyshev filters. **(04 Marks)**

6 a. Obtain parallel form and cascade form realization of the transfer function:

$$H(z)=\frac{8z^3-4z^2+11z-2}{\left(z-\frac{1}{4}\right)\left(z^2-z+\frac{1}{2}\right)}$$ **(10 Marks)**

b. A FIR filter is given by $y(n)=x(n)+\frac{2}{5}x(n-1)+\frac{3}{4}x(n-2)+\frac{1}{3}x(n-3)$. Sketch lattice structure. **(06 Marks)**

c. Obtain the direct form realization of linear phase FIR filter with transfer function

$$H(z)=1+\frac{2}{3}z^{-1}+\frac{15}{8}z^{-2}+\frac{2}{3}z^{-3}+z^{-4}$$ **(04 Marks)**

7 a. Derive an expression for frequency response of a symmetric linear phase FIR low pass filter for N = odd. **(07 Marks)**

b. A lowpass filter is to be designed with the following desired frequency response

$$H_d(\omega)=\begin{cases} e^{-j2\omega}, & |\omega|<\frac{\pi}{4} \\ 0, & \frac{\pi}{4}\le\omega\le\pi \end{cases}$$

Using rectangular window, find:

i) Impulse response
ii) Frequency response
iii) Transfer function **(07 Marks)**

c. Explain the frequency sampling design of FIR filters and realize it in DF structure. **(06 Marks)**

8 a. Explain how an analog filter is mapped on to a digital filter using impulse invariant method. **(06 Marks)**

b. Design a digital lowpass filter, using bilinear transformation method to satisfy the following characteristics:

i) Monotonic stopband and passband
ii) −3 dB cut-off frequency of 0.5π rad
iii) Magnitude down atleast −15 dB at 0.75π rad. **(10 Marks)**

c. Compare BLT and IIT. **(04 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, June/July 2019
Analog Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. If X and Y are the two random variables and are statistically independent. Prove that P(X, Y) = P(X) P(Y). **(06 Marks)**

b. Explain the following with necessary equations: i) Moments ii) Joint Moments. **(10 Marks)**

c. Explain central limit theorem. **(04 Marks)**

2 a. Draw the circuit diagram of square-law modulator. Explain and derive the expression for the output from the modulator. Draw the spectrum of the output of the modulator. **(08 Marks)**

b. A 300W carrier is simultaneously modulated by two audio waves with percentage modulations of 50 and 60 respectively. What is the total sideband power? Obtain the transmission efficiency. **(04 Marks)**

c. With a neat block diagram, explain the operation of Costas receiver. **(08 Marks)**

3 a. Explain with block diagram the operation of quadrature-carrier multiplexing system for both transmitter and receiver. **(08 Marks)**

b. Describe the operation of phase discrimination method for generating SSB-SC signal for single stage. **(04 Marks)**

c. With block diagram, necessary equations and spectrum explain the operation of synchronous detection of SSB-SC. **(08 Marks)**

4 a. Explain VSB. **(02 Marks)**

b. Explain time domain description of VSB signal. Draw the block diagram of phase discrimination method for generating VSB signals. **(08 Marks)**

c. Draw and explain the block diagram of frequency division multiplexing both transmitter and receiver. **(10 Marks)**

PART – B

5 a. For a single tone frequency modulation, derive the expression for modulated output. **(08 Marks)**

b. A sinusoidal modulating voltage of amplitude 5V and frequency 1kHz is applied to a frequency modulator. The frequency sensitivity of modulator is 50Hz/Volt. The carrier frequency is 100kHz. Calculate: i) Frequency deviations ii) Modulation index. **(04 Marks)**

c. Explain the block diagram of narrow band FM. For a single tone derive the expression for the output modulated wave. **(08 Marks)**

6 a. With a neat block diagram, explain the operation of FM demodulation using phase locked loop. **(10 Marks)**

b. Explain with relevant block diagram FM stereo multiplexing. **(10 Marks)**

7 a. Explain the following terms:
   i) Shot noise
   ii) Thermal noise
   iii) White noise
   iv) Noise figure. **(08 Marks)**

   b. Derive the expression for noise figure and equivalent noise temperature for N number of two port networks connected in cascade. **(08 Marks)**

   c. Two port devices are connected in cascade. For the first stage the noise figure and available power gain are 5dB and 12dB. For the second stage the noise figure and power gain are 15dB and 10dB. Determine overall noise figure in dB. **(04 Marks)**

8 a. Derive the expression for noise figure for DSB-SC receiver. **(12 Marks)**

   b. Explain functioning of preemphasis and de-emphasis in FM system. **(08 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, June/July 2019
Microwave and Radar

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of Smith chart to be provided.

PART – A

1 a. Starting from the fundamentals, derive expressions for voltage and current at any point on a microwave transmission line, by the method of distributed circuit theory. **(10 Marks)**

b. A telephone line has the primary constants, R = 6 Ω/km, L = 2.2 mH/km, c = 0.005 μF/km and G = 0.05 μ℧/km. Determine Z_0, α, β, V_p and λ at 1 kHz. **(10 Marks)**

2 a. Define : (i) Reflection coefficient (ii) Standing wave Ratio (iii) Transmission coefficient and (iv) Derive the relationship between reflection coefficient and standing wave ratio and the relation between Reflection coefficient and Transmission coefficient. **(10 Marks)**

b. A line of characteristic resistance R_0 = 400 Ω is terminated in a load impedance $Z_L = (200 + j300)\Omega$ and is excited by a matched generator at 800 MHz. Using Smith chart determine the location and length of a single stub nearest the load, to produce an impedance match. **(10 Marks)**

3 a. Explain various modes of operation of a Gunn Diode. Explain Ridley Watkin Hilsum theory. **(10 Marks)**

b. With a neat diagram, explain the working of a Two-Hole directional coupler. Derive the scattering matrix of the same. **(10 Marks)**

4 a. List various properties of S-matrix and starting from the impedance matrix equation prove the symmetry property of a reciprocal network. **(10 Marks)**

b. Obtain the relationship between the scattering parameters and ABCD parameters. **(10 Marks)**

PART – B

5 a. With a neat sketch, explain the characteristics and working of a Magic Tee. Derive its matrix. **(10 Marks)**

b. A 20 mW signal is fed into one of collinear port 1 of a lossless H-plane Tee function. Calculate the power delivered through each port when other ports are terminated in matched loads. **(05 Marks)**

c. "Hybrid Ring (Rat-Race circuit) performs similar functions as that of a magic tee, constructionally different". Substantiate the working of a Rat-Race circuit with a neat sketch and arrive at the scattering matrix. **(05 Marks)**

6 a. With a neat sketch, explain the construction of a microstrip line. Derive expression for attenuation constants and dielectric losses of a Parallel strip line. **(12 Marks)**

b. A lossless parallel strip line has a conducting strip 'W'. The substrate dielectric separating the two conducting strips has a relative dielectric constant $\in_{rd}$ of 6(beryllia or beryllium oxide BeO) and a thickness of 4 mm calculate:
   (i) The required width (w) of the conducting strip in order to have a characteristic impedance of 50 Ω.
   (ii) The strip-line capacitance
   (iii) The strip-line inductance
   (iv) The phase velocity of the wave in the parallel strip line. **(08 Marks)**

7 a. With a neat block diagram, explain the operation of a basic Radar system. **(10 Marks)**
   b. Derive the basic Radar Range equation as governed by the minimum receivable echo power P_{min}. **(10 Marks)**

8 a. With a neat block diagram, explain the working of the Moving Target Indicator (MTI) Radar. **(12 Marks)**
   b. Write explanatory notes on 'Doppler Effect', employed in Doppler Radar systems. **(04 Marks)**
   c. For an MTI Radar determine the first three Blind speeds at 2 GHz, when the Pulse Repetition Frequency (PRF) is 1 kHz. **(04 Marks)**

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10EC55

Fifth Semester B.E. Degree Examination, June/July 2019
Information Theory and Coding

Time: 3 hrs. Max. Marks:100

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

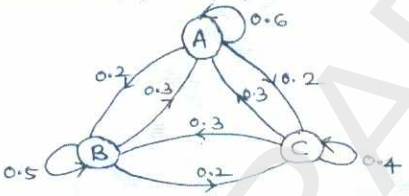
PART - A

1 a. Define the following with respect to information theory : i) Self Information ii) Entropy iii) Rate of Information iv) Mutual Information. **(04 Marks)**

b. Find the inter relationships between Hartley's nats and bits. **(06 Marks)**

c. For the first order Markov source shown in the fig.Q1(c), i) Find the stationary distribution ii) Entropy of each state and hence the entropy of source iii) Entropy of adjacent source and verify whether $H(S) < H(\overline{S})$. **(10 Marks)**

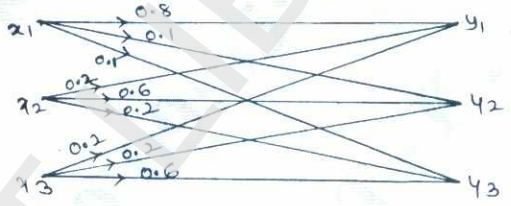
Fig.Q1(c)



2 a. Using Shannon's binary encoding procedure, construct a code for the following discrete source $S = \{S_1, S_2, S_3, S_4, S_5\}$ with $P = \{0.4, 0.25, 0.15, 0.12, 0.08\}$. **(10 Marks)**

b. Find the capacity of the discrete channel shown in fig. Q2(b). **(05 Marks)**

Fig.Q2(b)



c. Explain Rate of information transmission over a discrete memoryless channel. Justify that this is given $D_i = [H(X) - H(X/Y)]r_s$ bits/sec. **(05 Marks)**

3 a. Given an eight symbol source with probabilities **(12 Marks)**
$P = \{0.25, 0.20, 0.15, 0.15, 0.10, 0.05, 0.05, 0.05\}$ construct binary and ternary codes for the same using Huffman's encoding algorithm. Determine code efficiency in each case.

b. Noise matrix of a symmetric channel is illustrated below which has the following source symbol probabilities $P(x_1) = 2/3$; $P(x_2) = 1/3$.

$$P(Y/X) = \begin{bmatrix} 3/4 & 1/4 \\ 1/4 & 3/4 \end{bmatrix}$$

i) Determine H(X) , H(Y) , H(X, Y) , H(X/Y), H(Y/X) and I(X, Y).

ii) Determine channel capacity. **(08 Marks)**

4 a. An analog signal is band limited as 4KHz. It is sampled at 2.5times an Nyquist rate and each sample is quantized to 256 levels. These levels are equally likely to occur. The samples are assumed to be statistically independent. Find i) Information rate of the sampled signal ii) Can you Transmit the signal without errors on a Gaussian channel with 50KHz bandwidth and S/N ratio of 23 dB?

iii) What bandwidth is needed to transmit the signal without errors. if S/N ratio is 10dB? **(08 Marks)**

b. State Shannon – Hartley law. Derive an expression for the upper limit on the channel capacity as the band width tends to infinity. **(06 Marks)**

c. A friend of yours says that he can design a system for transmitting the output of a micro computer to a line printer operating at a speed of 30lines/minute over a voice grade telephone line with a bandwidth of 4KHz and (S/N) = 20dB. Assume that line printer needs eight bits of data per character and prints out 80 character per line. Would you believe him? **(06 Marks)**

PART - B

5 a. Consider a (6, 3) linear code whose generator matrix is given below :

$$G = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 1 & 1 & 0 & 1 \end{bmatrix}$$

Find i) All code words ii) All the Hamming weights and distances iii) Find minimum weight matrix and minimum weight iv) Parity check matrix v) Draw the encoder circuit. **(14 Marks)**

b. If C is a valid code vector such as C = DG, then prove that $CH^T = 0$, where H is the parity check matrix. **(06 Marks)**

6 a. A (15, 5) linear cyclic code has a generator polynomial **(12 Marks)**
$g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$.
i) Draw the block diagram of an encoder and syndrome calculator of this code.
ii) Find the code polynomial for $D(x) = 1 + x^2 + x^4$ in systematic form.
iii) If $V(x) = 1 + x^4 + x^6 + x^8 + x^{14}$, check whether it is a valid code polynomial or not.

b. Given $n \leq 7$, identify (n, k) values of the cyclic codes generated by the following generator polynomial. i) $g(x) = 1 + x^2 + x^3$ ii) $g(x) = 1 + x + x^2 + x^4$ iii) $g(x) = 1 + x^2 + x^3 + x^4$. **(08 Marks)**

7 Write short notes on :
a. RS codes.
b. Shortened cyclic codes.
c. Golay codes.
d. Burst error correcting codes. **(20 Marks)**

8 a. Consider (3, 1, 2) convolution code with $g^{(1)} = (110)$, $g^{(2)} = (101)$ and $g^{(3)} = (111)$. Draw the encoder block diagram and also find the generator matrix. **(08 Marks)**

b. For the convolution encoder shown in fig. Q8(b), if information sequence D = 10011, find the output sequence using i) Time domain approach ii) Transform domain approach. **(12 Marks)**

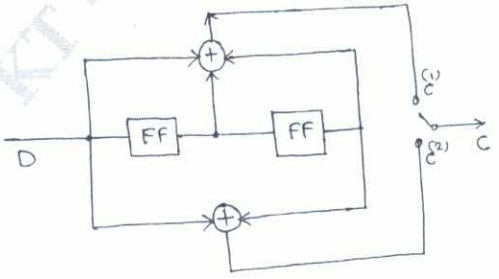


Fig.Q8(b)

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10EC56

Fifth Semester B.E. Degree Examination, June/July 2019
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With the help of neat diagram, explain the CMOS p-well process steps. Draw the CMOS p-well inverter. **(10 Marks)**

b. Write the voltage – transfer characteristics of an CMOS inverter. Derive the relevant equation to justify the characteristics. **(10 Marks)**

2 a. Explain design rule check and give the Lambda based design rules for
i) nMOS and CMOS wire
ii) Contacts. **(08 Marks)**

b. Draw the schematic and layout for the function $Y = \overline{A + BC}$ in CMOS design style. **(08 Marks)**

c. Draw the schematic circuit for the given layout in Fig Q2(c)

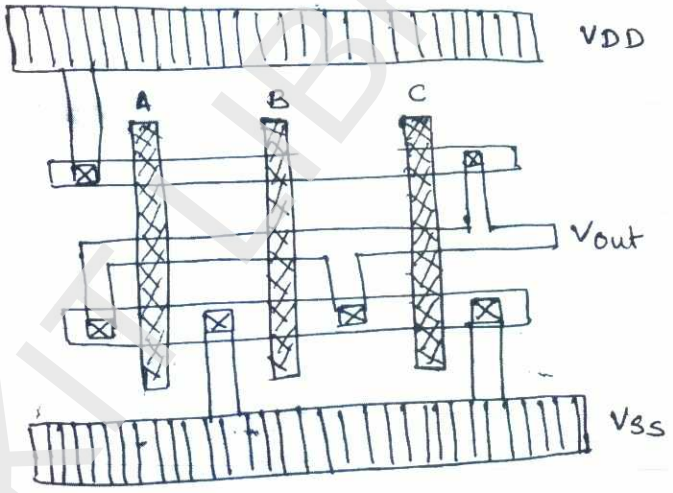

Fig Q2(c) **(04 Marks)**

3 a. Cascading of dynamic CMOS logic structure leads to an erroneous evaluation. Justify. Explain how it is overcome in domino CMOS logic. Give the advantages and disadvantages of domino CMOS logic. **(10 Marks)**

b. Draw the Pseudo – nMOS logic structure for the expression $Y = \overline{(AB + DE)C}$. **(05 Marks)**

c. Find out the node voltage and V_{out} of the given pass transistor chain shown in Fig Q3(c)-(i) and Q 3(c)-(ii) to pass logic 1.

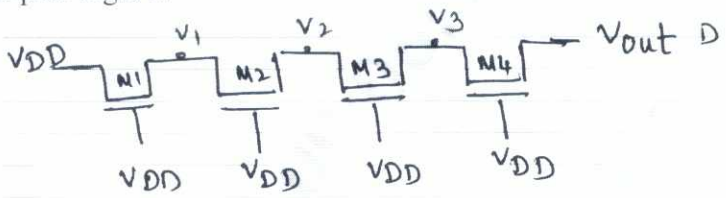

Fig Q3(c)-(i)

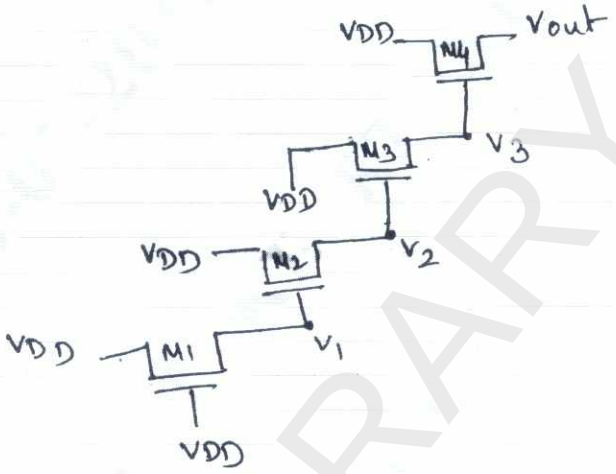

Fig Q 3(c)-(ii) **(05 Marks)**

4 a. Using the rise time and fall time model of CMOS inverter. Prove $\tau_r = 2.5\tau_f$ **(08 Marks)**

b. Calculate the total capacitance of the multilayered structure shown in Fig Q4(b) with gate to channel capacitance of $1\square C_g$, poly to substrate of $0.1\square C_g$ and Metal 1 to substrate of $0.075\square C_g$. **(07 Marks)**

c. Obtain the scaling factor of Gate delay and power dissipation per gate. **(05 Marks)**

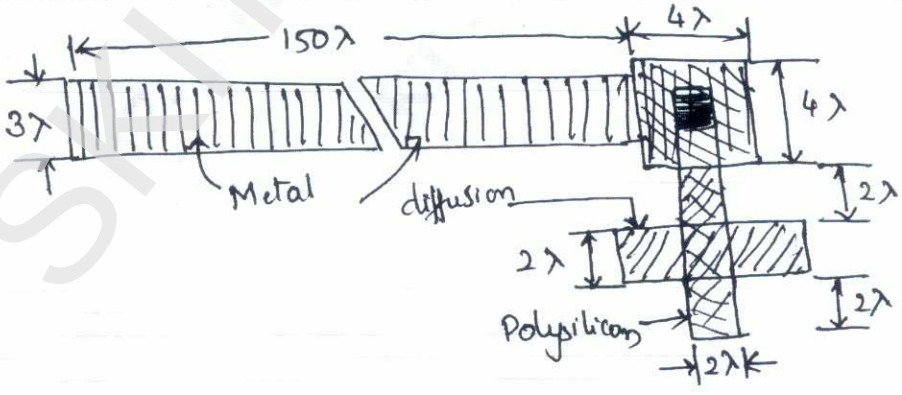

Fig Q4(b)

PART – B

5 a. Design a bus arbitration logic for n-line bus using structure design approach. **(10 Marks)**

b. What is charge storage? Explain a 4-bit dynamic shift register using nMOS switch. **(10 Marks)**

6 a. List the general subsystem design consideration. **(05 Marks)**

b. Define the term regularity. Explain in detail the design of 4-bit carry book ahead adder. **(10 Marks)**

c. Draw the logical diagram of 4-bit Baugh-Wooley multiplier. **(05 Marks)**

7 a. Describe the operation of 3-T dynamic RAM cell. Analyse the circuit for the parameter Area, Dissipation and volatility. **(10 Marks)**

b. Describe the read and write operation of 4-T dynamic and 6-T static memory cell with a neat circuit diagram. **(10 Marks)**

8 a. Explain the practical guidelines for testability to facilitate the test processes. Any five of them. **(10 Marks)**

b. Explain in detail the BILBO built in test generation scheme for the normal and scan modes of operation. **(10 Marks)**

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