10 EC, EE

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10AL51

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.

Fifth Semester B.E. Degree Examination, December 2012
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain different levels of management. **(10 Marks)**
b. What is scientific management? Explain **(10 Marks)**

2 a. What are the different steps involved in planning? **(10 Marks)**
b. What are single use and standing plans? Explain them with examples. **(10 Marks)**

3 a. Briefly explain the principles of organization. **(10 Marks)**
b. Discuss centralization v/s decentralization. **(10 Marks)**

4 a. Briefly explain comparison of Maslow's and Herzberg theories of Human motivation. **(10 Marks)**
b. What are different steps involved in controlling process? **(10 Marks)**

PART – B

5 a. Who are Intrapreuners? Explain the difference between Entrepreneurs and Intrapreuners. **(10 Marks)**
b. Explain the barriers involved in entrepreunership. **(10 Marks)**

6 a. What are the steps involved in starting a small scale industry? **(10 Marks)**
b. Explain the effect of WTO/GATT on Indian SSI. **(10 Marks)**

7 a. Explain the objectives and functions of KSFC and NSIC. **(10 Marks)**
b. Discuss various types of assistance provided by TECSOK and KSSIDC. **(10 Marks)**

8 a. Explain in detail the contents of "Project Report". **(10 Marks)**
b. What are network analysis techniques? Explain PERT and CPM. **(10 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, December 2012

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 normalized Chebyshev and Butterworth prototype tables are NOT ALLOWED.***

PART – A

1 a. Find the N-point DFT of x(n) if $x(n) = \begin{cases} \frac{1}{3}; & 0 \le n \le 2 \\ 0; & \text{otherwise} \end{cases}$. **(08 Marks)**

b. Two finite sequences x(n) = [x(0), x(1), x(2), x(3)] and h(n) = [h(0), h(1), h(2), h(3)] have DFTs given by X(R) = DFT {x(n)} = {1, J, -1, -J}; H(R) = DFT {h(n)} = {0, 1+J, 1, 1-J}. Use the properties of the DFT and find the following:

i) $X_1(R)$ = DFT {h(0), -h(1), h(2), -h(3)}

ii) $X_2(R)$ = DFT {y(n)} where $y(n) = x(n) \underset{4}{\circledast} h(n)$

iii) $X_3(R)$ = DFT{x(0), h(0), x(1), h(1), x(2), h(2), x(3), h(3)} **(12 Marks)**

2 a. Consider a length - 12 sequence defined for $0 \le n \le 11$, x(n) = {8, 4, 7, -1, 2, 0, -2, -4, -5, 1,4 , 3} with 12-point DFT given by X(R), $0 \le R \le 11$, evaluate the following function without computing DFT, $\sum_{R=0}^{11} e^{-\frac{J4R}{6}} \times (R)$ **(05 Marks)**

b. Determine $x_3(n) = x_1(n) \underset{8}{\circledast} x_2(n)$ for the sequences, $x_1(n) = e^{j\pi n}$; $0 \le n \le 7$; $x_2(n) = u(n) - u(n-5)$. Sketch all the sequences. Use time domain approach. **(08 Marks)**

c. Show that:

i) Real and even sequence has real DFT.

ii) Multiplication of two DFT's in frequency domain corresponds to circular convolution in time domain. **(07 Marks)**

3 a. Consider a FIR filter with impulse response h(n) = {3, 2, 1, 1} if the input is x(n) = {1, 2, 3, 3, 2, 1, -1, -2, -3, 5, 6, -1, 2, 0, 2, 1}, find the output y(n). Use overlap-add method assuming the length of block is 7. **(09 Marks)**

b. Write a note on Chirp z-transform. **(06 Marks)**

c. What is in-place computation? What is the total number of complex additions and multiplications required for N = 512 point, if DFT is computed directly and if FFT is used? Also find the number of stages required and its memory requirement. **(05 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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4 a. Derive DIT-FFT algorithm for N = 8 and draw the complete signal graph. **(12 Marks)**

b. Find the IDFT of X(R) = {0, 2 + 2j, –j4, 2 – 2j, 0 2+2j, j4, 2 – 2j} using inverse Radix – 2 DIT-FFT algorithm. **(08 Marks)**

PART – B

5 a. Design a Chebyshev analog low pass filter that has -3dB cut off frequency of 100 rad/sec and a stopband attenuation of 25 dB or greater for all radian frequencies past 250 rad/sec. Verify the design. **(10 Marks)**

b. Derive the s to z plane transformation based on finite backward difference method. Also show that the entire left half s-plane poles are mapped inside the smaller circle of radius ½ centered at z = ½ inside the unit circle in the z-plane. **(10 Marks)**

6 a. Obtain the direct form II (canonic) and cascade realization of

$$H(z) = \frac{(z-1)(z^2+5z+6)(z-3)}{(z^2+6z+5)(z^2-6z+8)}$$

the cascade system should consist of two biquadratic sections. **(10 Marks)**

b. Given $H(z) = (1 + 0.6z^{-1})^5$

i) Realize in direct form

ii) Realize as a cascade of first order sections only

iii) As a cascade of 1st and 2nd order sections. **(10 Marks)**

7 a. Using rectangular window technique, design a lowpass filter with passband gain of unity, cut off frequency of 1000 Hz and working at a sampling frequency of 5 kHz. The length of impulse response should be 7. **(10 Marks)**

b. With necessary mathematical analysis, explain the frequency sampling technique of FIR filter design. **(10 Marks)**

8 a. Design a digital filter H(z) that when used in A/D – H(z) – D/A structure, gives an equivalent analog filter with the following specifications:

PB Ripple ≤ 3.01 dB
PB Edge : 500 Hz
SB attenuation ≥ 15 dB
SB Edge : 750 Hz
Sample rate : 2 kHz

The filter is to be designed by performing a bilinear transformation on an analog system function. Use Butterworth prototype. Also obtain the difference equation. **(15 Marks)**

b. If $H_a(s) = \frac{1}{(s+2)(s+1)}$; find the corresponding H(z) using impulse invariance method for sampling frequency of 5 samples/sec. **(05 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, December 2012

Analog Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define random variables and differentiate between discrete and continuous random variables. **(07 Marks)**

b. Define mean, correlation and covariance functions. **(07 Marks)**

c. Define Gaussian process. List the properties. **(06 Marks)**

2 a. Explain the generation of AM wave using square law modulator and show that the output of square law modulator $V_2(t) = a_1 A_C\left[1 + \frac{2a_2}{a_1} m(t)\right]\cos 2\pi f_c t$. **(07 Marks)**

b. Explain the operation of coherent detection of DSB-SC modulating wave and show that the overall output $V_0(t) = \frac{1}{2} A_C \cos\phi\, m(t)$. **(07 Marks)**

c. The AM wave is given by $S(t) = A_C[1 + K_a m(t)]\cos 2\pi f_c t$ is applied to the system shown in Fig.Q2(c). Assume that the message signal m(t) is limited to the interval $|w| \le f$ and that $f_C >> w$. Show that m(t) can be obtained from the square rooter output. **(06 Marks)**

Fig.Q2(c)

3 a. Derive an expression for SSB modulated wave for which upper side band is retained. **(10 Marks)**

b. Fig.Q3(b) shows the block diagram of a two stage SSB modulator. The input signal m(t) consists of a voice signal occupying the frequency band 0.3 to 3.0 kHz. The two carrier frequencies are f_1 = 100 kHz and f_2 = 10 MHz.

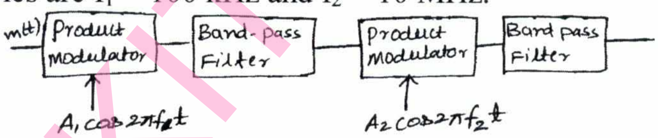

Fig.Q3(b)

Evaluate the following:

i) The sidebands of DSB-SC modulated waves at the output of the product modulators.
ii) The sidebands of the SSB modulators at the output of band pass filters.
iii) The passbands and the guardbands of the two bandpass filters.
iv) Sketch the spectrum of the signal at each stage. [Assume suitable m(f)] **(10 Marks)**

4 a. What is vestigial sideband? Explain the process of generation and detection of VSB modulated wave using a carrier $A_C \cos 2\pi f_C t$. **(09 Marks)**

b. With a block diagram, explain how downward and upward frequency translation is achieved. **(07 Marks)**

c. The incoming signal has a midband frequency that may lie in the range of 530 kHz to 1650 kHz. The associated a bandwidth is 10 kHz. This signal is to be translated to a fixed frequency band centered at 470 kHz. Determine the tuning range provided by the local oscillator. **(04 Marks)**

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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PART – B

5 a. Derive an expression for single tone sinusoidal FM wave; Determine frequency deviation and modulation index. **(06 Marks)**

b. A carrier wave of frequency 100 MHz is frequency modulated by a sinusoidal wave of amplitude 20 volts and frequency 100 kHz. The frequency sensitivity of the modulator is 25 kHz per volt.

i) Find the approximate bandwidth pf the FM signal using Carson's rule.

ii) Find the bandwidth by transmitting only those side frequencies whose amplitude exceed 1 percent of the unmodulated carrier amplitude. Use universal curve shown in Fig.Q5(b) for this calculation.

iii) Repeat the calculations, assuming that the amplitude of the modulating signal is doubled.

iv) Repeat the calculations, assuming the modulation frequency is doubled. **(08 Marks)**

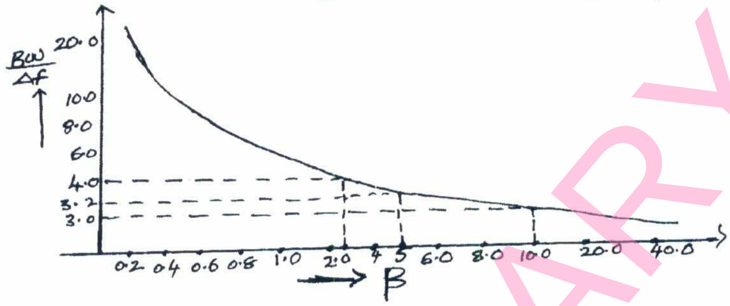

Fig.Q5(b)

c. Explain the generation of narrow band FM wave using indirect method. **(06 Marks)**

6 a. Explain how foster-Seelay discriminator is used for FM demodulation. **(08 Marks)**

b. Explain non-linearity and its effect in FM system. **(06 Marks)**

c. For a WBFM if narrow band carrier $f_1 = 0.1$ MHz, second carrier $f_2 = 9.5$ MHz, output carrier frequency is 100 MHz and $\Delta f = 75$ kHz. Calculate multiplying factors n_1 and n_2 if NBFM deviation is 20 Hz. Draw the suitable block diagram of the modulator. **(06 Marks)**

7 a. Explain the following terms:
i) Shot noise ii) Thermal noise **(06 Marks)**

b. Derive and show that the noise equivalent band width for RC low pass filter is $\frac{1}{4RC}$.

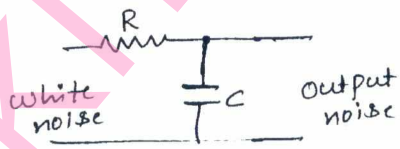

Fig.Q7(b)

(08 Marks)

c. An amplifier of power gain 20 dB has an input consisting of 100 μω signal power and 1 μω noise power. If the amplifier contributes an additional 100 μω of noise determine:

i) The output signal to noise ratio

ii) The noise factor and

iii) The noise figure. **(06 Marks)**

8 a. Find the figure of merit in AM when the depth of modulation is (i) 100%, (ii) 50%, (iii) 30%. **(06 Marks)**

b. Show that the figure of merit of a noisy FM receiver for single tone modulation is $3/2\ \beta^2$. **(10 Marks)**

c. Write a short note on pre-emphasis and de-emphasis. **(04 Marks)**

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Fifth Semester B.E. Degree Examination, December 2012
Microwaves and Radar

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting atleast TWO questions from each part.*
2. Use of smith chart is permitted.

PART – A

1 a. Derive transmission – line equations by the methods of distributed circuit theory. **(09 Marks)**

b. A single stub turner is to match a lossless line of 400 Ω to a load of (800 + j300)Ω. The frequency is 3 GHz
   i) Find the distance in meters from the load to the turning stub
   ii) Determine the length in meters of the short – circuited stub. **(06 Marks)**

c. Define reflection coefficient and derive an expression for reflection coefficient at load in terms of load impedance. **(05 Marks)**

2 a. Using the Helmholtz equation, derive the field equations for TE modes in rectangular waveguides. **(09 Marks)**

b. With a neat sketch, explain the four – port microwave circulator and also obtain the S – matrix. **(08 Marks)**

c. An air – filled rectangular waveguide of inside dimensions 7 × 3.5 cm operates in the dominant TE_{10} mode. Find
   i) the cutoff frequency
   ii) the phase velocity of the wave in the guide at a frequency of 3.5 GHz
   iii) the guided wavelength at the same frequency. **(03 Marks)**

3 a. With neat sketches, explain the IMPATT diode and draw the negative resistance curve. **(10 Marks)**

b. Explain the parametric amplifier with equivalence circuit. **(10 Marks)**

4 a. For a two port network, explain the S – parameters and properties of S – parameters. **(10 Marks)**

b. Explain the phase shifter, with neat sketches. **(10 Marks)**

PART – B

5 a. With neat sketch, explain the operation of E – plane tee and also obtain its S- matrix. **(10 Marks)**

b. With neat sketch, explain the operation of magic tee and mention its application. **(10 Marks)**

6 a. With neat schematic diagram, explain the coplanar strip lines. **(06 Marks)**

b. A lossless parallel strip line has a conducting strip width ω. The substrate dielectric separating the two conducting strips has a relative dielectric constant $\in_{rc}$ of 6 and a thickness of 4 mm. Calculate :

i) The required width ω of the conducting strip in order to have a characteristics 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)**

c. Write a note on shielded strip lines. **(06 Marks)**

7 a. Derive an expression for simple form of the radar range equation. **(05 Marks)**

b. With a neat block diagram, explain the conventional pulse radar with a super heterodyne receiver. **(08 Marks)**

c. Explain the applications of radar. **(07 Marks)**

8 a. Explain single delay – line canceller and frequency response of the single delay – line canceller, and also obtain the expression for blind speeds. **(10 Marks)**

b. A VHF radar at 220 MHz has a maximum unambiguous range of 180 nmi. What is its first blind speed? **(04 Marks)**

c. With neat block diagram, explain the original moving target detector signal processor. **(06 Marks)**

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Fifth Semester B.E. Degree Examination, December 2012

Information Theory and Coding

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least 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. Prove that the entropy of the following probability distribution function is $2-\left(\frac{1}{2}\right)^{n-2}$. **(08 Marks)**

Symbols:	x_1	x_2	x_3	....	x_{n-1}	x_n
Probability of $(x = x_i)$:	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{8}$	....	$\frac{1}{2^{n-1}}$	$\frac{1}{2^{n-1}}$

c. A sample space of events is shown in the diagram below with probability $P=\left\{\frac{1}{5},\frac{4}{15},\frac{8}{15}\right\}$,

i) Evaluate average uncertainity associated with the scheme.

ii) Average uncirtainity pertaining to the following probability scheme:

$P[A/M = B \cup C]$, $P\left[B/M, C/M\right]$

iii) Verify additive rule. **(08 Marks)**

2 a. Given the model of a Markoff source in Fig. Q2 (a)

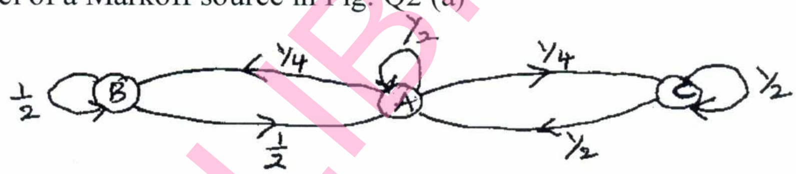

Fig. Q2 (a)

Find i) State probability ii) Entropy of first order and second order source

iii) Efficiency and redundancy of first order source

iv) Find rate of information if $r_s = 1$ sym/sec. **(10 Marks)**

b. Design an encoder using Shannons encoding algorithm for a source having six symbols and probability statistics $P=\left\{\frac{1}{2},\frac{1}{4},\frac{1}{8},\frac{1}{16},\frac{1}{32},\frac{1}{32}\right\}$. **(10 Marks)**

3 a. Consider a source with 8 alphabets A to H with respective probabilities of 0.22, 0.20, 0.18, 0.15, 0.10, 0.08, 0.05, 0.02

i) Construct a binary compact code and determine coding efficiency using Huffman coding algorithm.

ii) Construct ternary Huffman code and determine efficiency of the code. **(10 Marks)**

b. Prove that $H(X/Y) = p.H(X)$ for a binary erasure channel. **(05 Marks)**

c. Given the following channel matrix find the channel capacity: **(05 Marks)**

$$P\left(Y/X\right) = \begin{matrix} & y_1 & y_2 & y_3 \\ x_1 & 0.8 & 0.2 & 0 \\ x_2 & 0.1 & 0.8 & 0.1 \\ x_3 & 0 & 0.2 & 0.8 \end{matrix}$$

4 a. Define i) Differential entropy ii) Shannon's limit **(02 Marks)**

b. Prove that for an infinite bandwidth signal energy to noise ratio $\frac{E}{\eta}$ approaches a limiting value. **(06 Marks)**

c. A black and white TV picture may be viewed as consisting of 3×10^5 elements, each of which occupies 10 distinct brightness levels with equal probability. Assume rate of transmission as 30 picture frames per sec and SNR = 30 dB. Using channel capacity theorem compute minimum bandwidth to error free transmission of video signal. **(06 Marks)**

d. Prove that $\lim_{B\to\infty} C = 1.44\frac{S}{\eta}$. **(06 Marks)**

PART – B

5 a. Consider a systematic (7, 4) linear block code, the parity check matrix,

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

i) Find all possible code words.
ii) Draw encoding circuit.
iii) A single bit error has occurred in each of the following code words given:
$R_A = [0\ 1\ 1\ 1\ 1\ 1\ 0]$, $R_B = [1\ 0\ 1\ 1\ 1\ 0\ 0]$
Detect and correct these errors
iv) Draw syndrome computation circuit. **(12 Marks)**

b. Find generator matrix G and H-matrix for a linear block code with $d_{min} = 3$ and message block size of 8 bits. **(04 Marks)**

c. Test hamming bound of (7, 4) hamming code and show that it is a perfect code. **(04 Marks)**

6 a. Design an encoder for (7, 4) binary cyclic code generated by $G(x) = 1 + x + x^3$ and verify its operation using message vectors (1 0 0 1) and (1 0 1 1). Also verify the code obtained using polynomial arithmetic. **(10 Marks)**

b. For a (7, 4) cyclic code with received vector Z is 1 1 1 0 1 0 1, with the generator polynomial $G(x) = 1 + x + x^3$. Draw the syndrome computation circuit and correct, the error in the received vector. **(10 Marks)**

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

8 a. For the convolution encoder shown in Fig. Q8 (a).
i) Find impulse response and hence calculate the output produced by the information sequence (1 0 1 1 1).
ii) Write the generator polynomials of the encoder and recompute the output of the input of (i) and compare with that of (ii). **(08 Marks)**

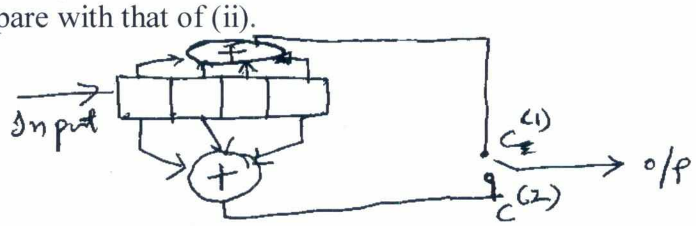

Fig. Q8 (a)

b. Consider a (3, 1, 2) convolution encoder with $g^{(1)} = 1\ 1\ 0$ and $g^{(2)} = 1\ 0\ 1$, $g^{(3)} = 1\ 1\ 1$. Draw encoder block diagram, find generator matrix. Find code vector corresponding to information sequence D = 1 1 1 0 0 0 using time and frequency domain approach. Draw state diagram and code tree. **(12 Marks)**

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Fifth Semester B.E. Degree Examination, December 2012
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least 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. Explain the nMOS fabrication process with neat diagram. **(10 Marks)**

b. Obtain the dc transfer characteristics of a CMOS inverter and mark all the region showing the status of PMOS and NMOS. **(10 Marks)**

2 a. Compare CMOS and bipolar technologies. **(04 Marks)**

b. Draw the circuit schematic and stick diagram of CMOS 2 input NAND gate. **(06 Marks)**

c. Draw the layout for the schematic shown in the Fig.Q.2(c). **(10 Marks)**

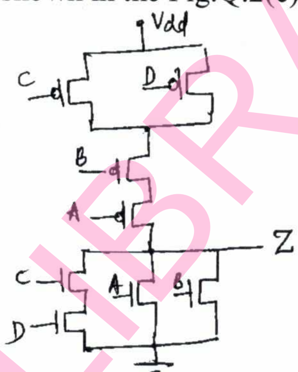

Fig.Q.2(c)

3 a. Explain the operation of CMOS dynamic logic. Also discuss the cascading problem of dynamic CMOS logic. **(10 Marks)**

b. Realize $Z = \overline{A(B+C)+DE}$ for clocked CMOS logic. **(05 Marks)**

c. Find the equation for the node voltages V_1, V_2, V_3 during logic "1" transfer, when each pass transistor is driving another pass transistor, as shown in Fig.Q.3(c). Assume threshold voltage of each transistor is V_{tn}. **(05 Marks)**

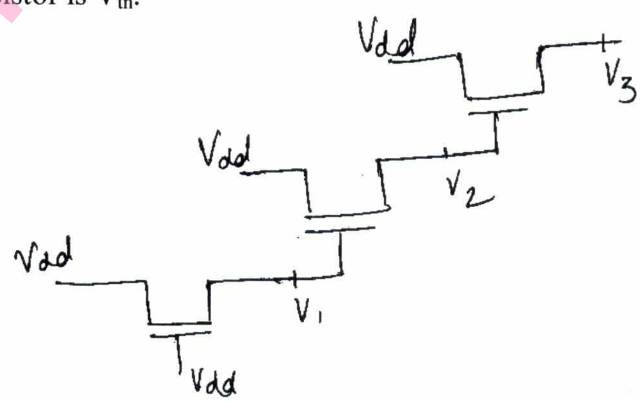

Fig.Q.3(c)

4 a. Find the scaling factors for:
   i) Channel Resistance Ron
   ii) Current density J. **(06 Marks)**
 b. Derive the equation for rise time and fall time for CMOS inverter. **(08 Marks)**
 c. Write a note on limitations of scaling. **(06 Marks)**

PART – B

5 a. Explain structured design of bus arbitration logic for n-line bus. **(10 Marks)**
 b. Explain dynamic 4-bit shift register using CMOS logic. **(10 Marks)**

6 a. Design 4-bit ALU to implement addition, subtraction, EXOR, EXNOR, OR and AND operations. **(10 Marks)**
 b. With the neat diagram, explain Braun array multiplier. **(10 Marks)**

7 a. Explain the working of three-transistor dynamic RAM cell. **(06 Marks)**
 b. Explain one transistor dynamic memory cell with schematic and stick diagram. **(06 Marks)**
 c. Discuss CMOS pseudo-static memory cell with stick diagram. **(08 Marks)**

8 a. Explain sensitized path-based testing for combinational logic. **(10 Marks)**
 b. Write a note on ground rules for successful design. **(10 Marks)**

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