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10AL51

Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Management and Entrepreneurship

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.

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PART – A

1 a. Define management. Write various characteristics of management. **(05 Marks)**
b. Briefly explain the various levels and skills required at different management levels. **(05 Marks)**
c. Explain the various functions of management. **(10 Marks)**

2 a. Define planning and discuss its importance. **(05 Marks)**
b. Write differences between strategic planning and tactical planning. **(05 Marks)**
c. Explain various steps of planning. **(10 Marks)**

3 a. What is an organization? Explain the purpose and nature of an organization. **(05 Marks)**
b. What are principles of organization? **(05 Marks)**
c. Briefly explain the steps in the selection procedure. **(10 Marks)**

4 a. Explain Maslow's theory of motivation. **(05 Marks)**
b. What are the qualities of a good leader? **(05 Marks)**
c. Briefly explain the essentials of sound controlling. **(10 Marks)**

PART – B

5 a. What are the qualities of an entrepreneur? **(05 Marks)**
b. Explain the types of entrepreneur. **(05 Marks)**
c. Explain the various stages in entrepreneurial process. **(10 Marks)**

6 a. Enumerate the characteristics of small scale industries. **(05 Marks)**
b. Describe the objectives of small scale industries in India. **(05 Marks)**
c. Explain the steps involved in setting up a small scale industry. **(10 Marks)**

7 a. Mention important central and Karnataka state government institutions providing support to SSIs. **(05 Marks)**
b. What are the objectives and functions of KIADB? **(05 Marks)**
c. Write short notes on any two:
i) Karnataka State Finance Corporation (KSFC).
ii) Karnataka State Small Industries Development Corporation (KSSIDC).
iii) District Industries Centre (DIC). **(10 Marks)**

8 a. Write various points to be considered for project identification. **(05 Marks)**
b. Write differences between PERT and CPM. **(05 Marks)**
c. Explain in detail the contents of "Project Report". **(10 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Digital Signal Processing

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.
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PART – A

1 a. Given the following x(n) : $x(n) = \delta(n) + \delta(n-1) + \delta(n-2)$

(i) Find the Fourier transform $X(e^{jw})$ and plot the $|X(e^{jw})|$

(ii) Get the magnitude of the 4-point DFT of the first four samples of x(n)

(iii)Get the magnitude of the 8-point DFT of the first eight samples of x(n) **(10 Marks)**

b. Find the 4-point DFT of the sequence, $x(n) = 6 + \sin\frac{2\pi n}{4}$, $0 \le n \le 3$. **(06 Marks)**

c. Consider the sequence $x_1(n) = \{0, 1, 2, 3, 4\}$ and $x_2(n) = \{0, 1, 0, 0, 0\}$. Determine the sequence y(n) so that $Y(K) = X_1(K)\, X_2(K)$. $X_1(K)$ and $X_2(K)$ are 5-point DFTs of $x_1(n)$ and $x_2(n)$ respectively. **(04 Marks)**

2 a. A sequence $x(n) = \begin{cases} 1 & 0 \le n \le 3 \\ 0 & 4 \le n \le 7 \end{cases}$ has an 8-point DFT X(K). Compute the DFT of $x_2(n)$ and $x_3(n)$ in terms of X(K), for

$$x_2(n) = \begin{cases} 1 & n = 0 \\ 0 & 1 \le n \le 4 \\ 1 & 5 \le n \le 7 \end{cases}, \quad x_3(n) = \begin{cases} 0 & 0 \le n \le 1 \\ 1 & 2 \le n \le 5 \\ 0 & 6 \le n \le 7 \end{cases}$$ **(06 Marks)**

b. Consider a sequence x(n) = (8, 3, 4, 1, -5, -4, -2, 0, 2, -1, 7, 4). Evaluate the following without explicitly computing X(K).

(i) DFT[DFT[DFT[DFT[x(n)]]]]

(ii) $\sum_{K=0}^{11} X(K)$

(iii) $\sum_{K=0}^{11} e^{\frac{-j\pi K}{6}} X(K)$ **(10 Marks)**

c. x(t) is an analog signal having a bandwidth of 4 kHz. It is desired to compute the spectrum of this signal using $N = 2^M$ point DFT with a resolution better than or equal to 50 Hz. Determine the minimum sampling rate and the resulting resolution (M is an integer). **(04 Marks)**

3 a. Using overlap-save method, compute y(n), of a FIR filter with impulse response h(n) = (3, 2, 1) to an input x(n) = (2, 1, -1, -2, -3, 5, 6, -1, 2, 0, 2, 1). Use only 8-point circular convolution. Can the system exhibit linear phase? **(12 Marks)**

b. Show that the product of two complex numbers (a+jb) and (c+jd) can be performed with three real multiplications and five additions. **(04 Marks)**

c. Bring out a comparison between linear convolution and circular convolution. **(04 Marks)**

4 a. Using DIFFFT algorithm, compute DFT of the sequence,
$x(n) = (1, 2, -1, 2, 4, 2, -1, 2)$
If $x_1(n)=x(n-4)_8$, compute $x_1(K)$ without invoking FFT algorithm. **(14 Marks)**

b. Compute the DFT of the sequence $x(n) = (1, 2, 1, 2)$ using the Goertzel algorithm. **(06 Marks)**

PART – B

5 a. Show that the bilinear transformation maps.
(i) The jΩ axis in s-plane onto the unit circle, $|z| = 1$.
(ii) The left half s-plane, Re(s)<0 inside the unit circle, $|z| < 1$ **(08 Marks)**

b. Design a digital low-pass filter using the bilinear transformation method to satisfy the following characteristics: (i) Monotonic stopband and passband (ii) -3.01 dB cut off frequency of 0.5 π rad; (iii) Magnitude down atleast 15 dB at 0.75π rad. **(08 Marks)**

c. Bring out a comparison between Butterworth filter and Chebyshev filter. **(04 Marks)**

6 a. Transform $H(s) = \frac{s+a}{(s+a)^2 + b^2}$ into a digital filter using impulse invariance technique. **(08 Marks)**

b. Let $H(s) = \frac{1}{s^2 + \sqrt{2}s + 1}$, for a 2nd order low pass Butterworth filter prototype. Determine the system function for the digital bandpass filter using bilinear transformation. The cutoff frequencies for the digital filter should lie at $\omega_L = \frac{5\pi}{12}$ and $\omega_u = \frac{7\pi}{12}$. Take T = 2. **(08 Marks)**

c. What does linear phase do to the response of an input signal within the passband of the filter? Why choose an IIR filter instead of an FIR filter? **(04 Marks)**

7 Find the unit sample response of a symmetric FIR filter having a length of 9 samples. The desired frequency response is given by, $H_\alpha(\omega) = \begin{cases} e^{-j\omega\alpha} & |\omega| \le \omega_C \\ 0 & |\omega| \ge \omega_C \end{cases}$, where $\omega_C = \frac{\pi}{2}$ and $\omega_{Hanning}(n) = \frac{1}{2}\left[1 - \cos\left(\frac{2\pi n}{N-1}\right)\right]$, $0 \le n \le (N-1)$. Also find H(z), linear constant coefficient difference equation and the frequency response $H(e^{j\omega})$. Draw the structure of the filter. **(20 Marks)**

8 a. Obtain the series and parallel form realization for a digital filter described by the system function,
$$H(z) = \frac{8z^3 - 4z^2 + 11z - 2}{\left(z - \frac{1}{4}\right)\left(z^2 - z + \frac{1}{2}\right)}.$$ **(14 Marks)**

b. Determine the parameters K_m of the lattice filter corresponding to the FIR filter described by,
$H(z) = 1 + 2.82z^{-1} + 3.408z^{-2} + 1.74z^{-3}$ **(06 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Analog Communications

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.
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PART – A

1 a. Explain the terms joint probability density function of random variables x and y; conditional probability density function of y; statistically independent random variables. **(06 Marks)**

b. Define mean, autocorrelation and auto covariance functions. **(06 Marks)**

c. Prove the following two properties of the auto correlation function $R_x(\tau)$ of a random process x(t):

i) If x(t) contains a dc component equal to A, then $R_x(\tau)$ will contain a constant component equal to A^2.

ii) If x(t) contains a sinusoidal component, then $R_x(\tau)$ will also contain a sinusoidal component of the same frequency. **(08 Marks)**

2 a. Explain the generation of AM wave using square law modulator, show the spectrum before and after filtering process. **(07 Marks)**

b. Using the message signal $m(t) = \frac{t}{1+t^2}$. Determine and sketch the modulated wave for amplitude modulation whose percentage modulation equals i) 50%; ii) 100%; iii) 125%. **(05 Marks)**

c. Explain the method of obtaining a practical synchronous receiving system with DSBSC modulated wave using costas loop. **(08 Marks)**

3 a. What is the significance of single side band modulation? Give the frequency domain description of the same. **(04 Marks)**

b. Explain with block diagram a frequency discrimination method (two stage) for generating SSB modulated wave. **(08 Marks)**

c. Consider a message signal m(t) containing frequency components at 100, 200 and 400Hz. This signal is applied to an SSB modulator together with a carrier at 100 kHz, with only the upper side band retained. In the coherent detector used to recover m(t), the local oscillator supplies a sine wave of frequency 100.02 kHz. Determine the frequency components of the detector output. **(08 Marks)**

4 a. Explain the scheme for generation of VSB modulated wave with relevant block diagrams and construct the positive frequency portion of the frequency response of a side band shaping filter for a VSB modulated wave that contains a vestige of lower side band. **(10 Marks)**

b. What is heterodyning? Consider a DSBSC modulated signal as a input to a mixer, specify the parameters of the filter and local oscillator components of a mixer to do the downward frequency translation with spectrum diagram. **(10 Marks)**

PART – B

5 a. With neat block diagram, explain the generation of narrow band FM wave. **(05 Marks)**

b. The sinusoidal modulating wave $m(t) = A_m \cos(2\pi f_m t)$ is applied to a phase modulator with phase sensitivity K_p. The unmodulated carrier wave has frequency f_c and amplitude A_c. Determine the spectrum of the resulting phase-modulated signal, assuming that the maximum phase deviation $\beta_p = K_p A_m$ does not exceed 0.3 radians. **(05 Marks)**

c. With neat circuit diagram, describe the direct method of generating FM. Also explain feedback scheme for frequency stabilization of a frequency modulator in direct method. **(10 Marks)**

6 a. Explain demodulation of FM signal using zero crossing detectors. **(05 Marks)**

b. Write short notes on non-linear effects in FM systems. **(05 Marks)**

c. Explain with relevant mathematical expressions the demodulation of FM signal using PLL. **(10 Marks)**

7 a. Define white noise. Plot Power Spectral Density (PSD) and auto correlation function (ACF) of ideal low pass filtered white noise. **(06 Marks)**

b. Define noise equivalent bandwidth. Derive the expression for the same. **(08 Marks)**

c. Fig.Q.7(c) shows a typical microwave receiver used in satellite communication. Evaluate: i) The overall noise figure of the receiver and ii) The overall equivalent temperature of the receiver. Assume that ambient temperature T = 17°C. **(06 Marks)**

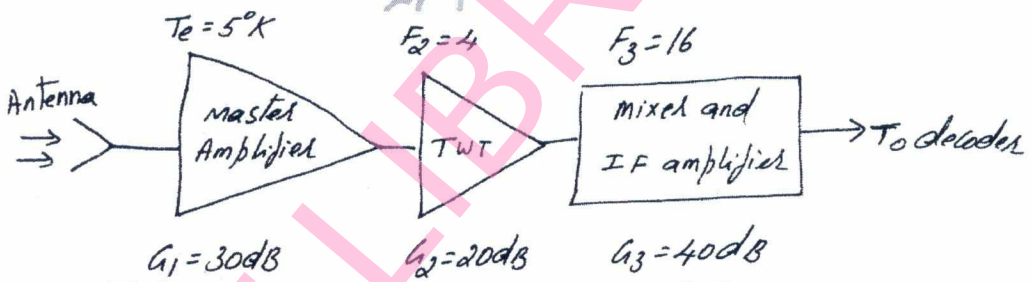

Fig.Q.7(c)

8 a. Derive the expression for figure of merit for SSB receiver. **(10 Marks)**

b. Explain threshold effects in FM. **(06 Marks)**

c. A carrier reaching an envelope detector in an AM receiver has an RMS value equal to 1 volt in the absence of modulation. The noise at the input of the envelope detector has a PSD equal to 10^{-3} watts/Hz. If the carrier is modulated to a depth of 100% and message bandwidth, W = 3.2 kHz. Find out put signal-to-noise ratio. **(04 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, Dec.2013 / Jan. 2014
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 is permitted.***

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

1 a. By considering elementary section of a transmission line derive transmission line equations. **(08 Marks)**

b. Derive an expression for the line impedance of transmission line in terms of Z_s and Z_o. **(05 Marks)**

c. A load impedence of $Z_R = 60 - j\,80\Omega$ is required to be matched to a 50 ohm co – axial line, by using a short circuited stub of length 'ℓ' located at a distance 'd' from the load. The wavelength of operation is 1 meter. Using Smith chart, find 'd' 'ℓ'. **(07 Marks)**

2 a. With a neat diagram, explain the working of a two hole directional coupler. Also derive the scattering matrix of the same. **(10 Marks)**

b. With neat diagram, explain the operation of a Faraday rotation isolator. **(10 Marks)**

3 a. What is 'Gunn Effect'? With a neat diagram explain the constructional details of a Gunn diode. **(08 Marks)**

b. Give a brief account of RWH theory. **(06 Marks)**

c. With neat diagram, explain the construction and operation of Schattley barrier diode. **(06 Marks)**

4 a. Explain S – matrix representation of multiport network. **(07 Marks)**

b. Explain symmetrical Z and Y matrix for reciprocal network. **(08 Marks)**

c. Explain symmetric properties of S – matrix. **(05 Marks)**

PART - B

5 a. With a neat diagram, explain the working of a precision type phase shifter. **(10 Marks)**

b. With a neat diagram, explain the working of a H – plane Tee Junction. Also derive its scattering matrix. **(10 Marks)**

6 a. Calculate the characteristic impedance of a wide microstrip line having negligible thickness and having a width at 0.8mm, thickness at substrate 0.2mm and has a dielectric constant 3.55. **(04 Marks)**

b. Explain the various losses taking place in microstrip lines. **(08 Marks)**

c. With a neat diagram, explain shielded strip lines. **(08 Marks)**

7 a. Derive radar range equation in terms of effective aperture, radar cross section of target and minimum detectable signal power of receiver. **(10 Marks)**

b. Discuss various applications of radar. **(05 Marks)**

c. What is meant by minimum detectable signal power of receiver? **(05 Marks)**

8 a. Explain the MTI radar, with neat block diagram. **(10 Marks)**

b. With neat block diagram, explain moving target detector. **(05 Marks)**

c. A Doppler radar set operates at 12 GHz and is used for traffic speed measurement, what are Doppler frequencies for the speed of 40Kmph and 100 kmph. **(05 Marks)**

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10EC55

Fifth Semester B.E. Degree Examination, Dec.2013/Jan.2014
Information Theory and Coding

Time: 3 hrs. Max. Marks:100

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

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PART – A

1 a. Define: i) Unit of information, ii) Entropy, iii) Information rate. **(06 Marks)**

b. The output of an information source consists of 128 symbols 16 of which occur with a probability of 1/32 and remaining occurs with a probability of 1/224. The source emits 1000 symbols/sec assuming that symbols are chosen independently. Find the average information rate of the source. **(04 Marks)**

c. Find G_1 and G_2 and verify that $G_1 > G_2 > H(s)$.

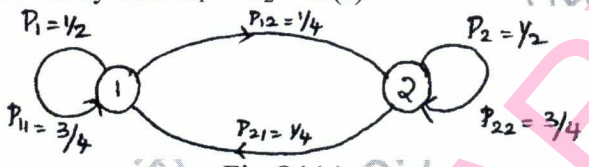

Fig.Q1(c) **(10 Marks)**

2 a. Show that $H(X, Y) = H(X/Y) + H(Y)$. **(04 Marks)**

b. Apply Shannon encoding algorithm to the following message:

Symbols	S_1	S_2	S_3
Probabilities	0.5	0.3	0.2

i) Find the code efficiency and redundancy.

ii) If the same technique is applied to the second order extension of the source, how much will the redundancy be improved. **(10 Marks)**

c. A technique used in a source encoder is to arrange message in a order of decreasing probability, divide message into two almost equal groups. Message in 1st group are assigned zero. Messages in 2nd group are assigned with 1. Procedure is repeated till no further division is possible. Find code words for 6 messages. **(06 Marks)**

3 a. State Shannon's Hartley law and its implifications. **(05 Marks)**

b. Apply Huffman coding procedure for the following set of messages and determine the efficiency of the binary code so formed symbols X_1, X_2, X_3 with probabilities 0.7, 0.15, 0.15. If the same technique is applied to the 2nd order extension for the above messages. How much will the efficiency be improved? **(10 Marks)**

c. For an AWGN channel with 4 kHz B.W and noise spectral density $N_o/2 = 10^{-12}$ W/Hz. The signal power required at the receiver is 0.1 mW. Calculate the capacity of the channel. **(05 Marks)**

4 a. State the properties of mutual information. **(04 Marks)**

b. For the JPM given below, compute individually H(X), H(Y), H(X, Y), H(Y/X), H(X/Y) and I(X, Y). Verify the relationship among these entropies.

$$P(X, Y) = \begin{bmatrix} 0.05 & 0 & 0.20 & 0.05 \\ 0 & 0.10 & 0.10 & 0 \\ 0 & 0 & 0.20 & 0.10 \\ 0.05 & 0.05 & 0 & 0.10 \end{bmatrix}$$ **(10 Marks)**

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10EC56

Fifth Semester B.E. Degree Examination, Dec. 2013 / Jan 2014.
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

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

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PART - A

1 a. Explain the fabrication steps of CMOS P – well process with neat diagram and write the mask sequence. **(12 Marks)**

b. List the threshold voltage equations and emphasize each term. **(08 Marks)**

2 a. Write the CMOS inverter circuit and briefly explain. Write the CMOS VTC showing regions A, B, C, D, E. Derive the expressions for output voltage in region 'B'. **(10 Marks)**

b. Write the circuit and layout for $Y = \overline{AB + CD + E}$ in CMOS style. **(10 Marks)**

3 a. Write the circuit and stick diagram for CMOS tristate inverter. **(04 Marks)**

b. Write the circuit of Bi CMOS NAND and NOR gate and briefly explain. **(08 Marks)**

c. Explain the circuit of dynamic CMOS logic by taking an example of the function $Y = \overline{A(B+C)+DE}$. **(08 Marks)**

4 a. Define Sheet Resistance (Rs) and standard unit of capacitance (□Cg). Calculate the on resistance of 4:1 nmos inverter with Rs = 10kΩ/□, $Z_{pu} = \frac{8\lambda}{2\lambda}$, $Z_{pd} = \frac{2\lambda}{2\lambda}$. Also estimate the total power dissipated if V_{DD} = 5V. **(08 Marks)**

b. Calculate the capacitance in □ Cg for the given metal layer shown in fig.Q4(b), if feature size = 5μm and relative value of metal to substrate = 0.075. **(05 Marks)**

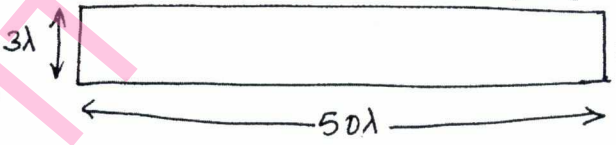

Fig.Q4(b)

c. Explain briefly the circuit of inverting and non – inverting super buffer. **(07 Marks)**

PART - B

5 a. Calculate the O/P voltage V_{out} in the circuit given below for different values of V_a, V_b. **(04 Marks)**

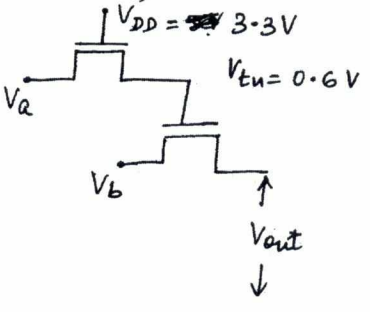

Fig.Q5(a)

Va	Vb
3·3	3·3
1·5	1·5
3·3	0
0	1·5

b. Design Bus Arbitration logic for n – line bus. **(10 Marks)**

c. Consider λ – based design rules and 5μm technology. How many nmos 8:1 inverter $\left(Z_{pu} = \frac{16\lambda}{2\lambda} \text{ and } Z_{pd} = \frac{2\lambda}{2\lambda}\right)$ can be driven by a minimum size conductor which is 3λ wide and 1μm thick? Assume $J_{th} = 1mA/(\mu m)^2$, $R_s = 10K\Omega / \square$, $V_{DD} = 5V$. **(06 Marks)**

6 a. Discuss the 4 phase clocking scheme to avoid the problem of cascading in dynamic CMOS logic. **(06 Marks)**

b. What are the adder enhancement techniques? Briefly explain. **(04 Marks)**

c. Write and explain 6 – bit carry select adder. **(10 Marks)**

7 a. Write and explain 4 Transistor dynamic and 6 Transistor static CMOS memory cell with sense amplifier. **(12 Marks)**

b. Explain the one transistor dynamic memory cell emphasizing three plate capacitor. **(08 Marks)**

8 Write short notes on :

a. Latch up. **(07 Marks)**

b. Nature of failures in CMOS. **(06 Marks)**

c. I/O pads. **(07 Marks)**

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