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10AL51

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Management and Entrepreneurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the various functions of management. **(10 Marks)**
b. Explain the roles of a manager. **(10 Marks)**

2 a. Discuss the importance of planning. Differentiate between strategic planning and tactical planning. **(10 Marks)**
b. With a flow chart, explain the steps involved in decision making. **(10 Marks)**

3 a. What are the principles of an organization? Explain. **(10 Marks)**
b. Explain briefly the steps involved in selection process. **(10 Marks)**

4 a. Explain briefly Herzberg's theory of motivation. **(10 Marks)**
b. What are the essentials of a sound control system? Explain. **(10 Marks)**

PART – B

5 a. Define the term 'Entrepreneur'. Differentiate between entrepreneur and Intrapreneur. **(10 Marks)**
b. Explain the stages in entrepreneurial process. **(10 Marks)**

6 a. What are the steps involved in setting up of small scale industry (SSI)? Explain. **(10 Marks)**
b. What are the objectives and functions of world trade organization (WTO)? Explain. **(10 Marks)**

7 a. Explain the objectives and functions of NSIC and KSFC. **(10 Marks)**
b. Write short notes on KSSIDC and SISI. **(10 Marks)**

8 a. Explain in detail the guidelines for preparation of project report. **(10 Marks)**
b. What are the various network analysis techniques? Differentiate between PERT and CPM. **(10 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
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 filter tables not permitted.

PART – A

1 a. Define N-point DFT and IDFT of a sequence. **(03 Marks)**

b. Find the 8-point DFT of the sequence $x(n) = \{1,1,1,1,1,1,0,0\}$. **(08 Marks)**

c. Find the IDFT of X(K) = {4, -2j, 0, 2j}. **(06 Marks)**

d. Obtain the relation between DFT and Z-transform. **(03 Marks)**

2 a. State and prove circular convolution property. **(06 Marks)**

b. For x(n) = {7, 0, 8, 0}, find y(n), if $Y(K) = X((K-2))_4$. **(06 Marks)**

c. Let x(n) = {1, 2, 0, 3, -2, 4, 7, 5}. Evaluate the following :

i) X(0) ii) X(4) iii) $\sum_{K=0}^{7} X(K)$ iv) $\sum_{K=0}^{7} |X(K)|^2$ **(08 Marks)**

3 a. In the direct computation of N-point DFT of x(n), how many
i) Complex multiplications, ii) Complex additions iii) Real multiplications
iv) Real additions and v) Trigonometric function evaluations are required. **(10 Marks)**

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

4 a. Develop 8-point DIF-FFT radix-2 algorithm and draw the signal flow graph. **(10 Marks)**

b. Find 8-point DFT of a sequence x(n) = {1, 1, 1, 1, 0, 0, 0, 0} using DIT-FFT radix-2 algorithm. Use butterfly diagram. **(10 Marks)**

PART – B

5 a. Given $|H_a(j\Omega)|^2 = \frac{1}{(1+4\Omega^2)}$, determine the analog filter system function $H_a(s)$. **(08 Marks)**

b. Let $H(s) = \frac{1}{(s^2+\sqrt{2}s+1)}$ represent transfer function of a low pass filter with a pass band of 1 rad/sec. Use frequency transformation to find the transfer functions of the analog filters,
i) A LPF with pass band of 10 rad/sec.
ii) A HPF with cut-off frequency of 5 rad/sec. **(08 Marks)**

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

6 a. Realize the FIR filter $H(z) = \frac{1}{2} + \frac{1}{3}z^{-1} + z^{-2} + \frac{1}{4}z^{-3} + z^{-4} + \frac{1}{3}z^{-5} + \frac{1}{2}z^{-6}$ in direct form. **(04 Marks)**

b. Obtain direct form-I, direct form – II, cascade and parallel form realization for the following system: $y(n) = 0.75y(n-1) - 0.125y(n-2) + 6x(n) + 7x(n-1) + x(n-2)$ **(16 Marks)**

7 a. A LPF is to be designed with frequency response,

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

Determine $h_d(n)$ and h(n) if $\omega(n)$ is a rectangular window,

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

Also, find the frequency response, $H(\omega)$ of the resulting FIR filter. **(10 Marks)**

b. Explain the design of linear phase FIR filter using frequency sampling technique. **(10 Marks)**

8 a. Explain the design of IIR filter by using Impulse Invariance Method (IIM) technique also explain mapping of analog to digital filter by IIM. **(10 Marks)**

b. Convert the analog filter with system function, $H_a(s) = \frac{s+0.1}{(s+0.1)^2+16}$ into a digital IIR filter by means of bilinear transformation (BLT). The digital filter is to have a resonant frequency of $\omega_r = \frac{\pi}{2}$ **(10 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

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. Describe mean, correlation and covariance functions with respect to stationary random process. **(06 Marks)**

b. State and discuss central limit theorem. **(08 Marks)**

c. Let X be a continuous random variable having a uniform probability distribution defined in the range $2 \leq x \leq 4$. Let $y = 3X + 2$. Find the means m_x and m_y. **(06 Marks)**

2 a. Explain the need for modulation. **(06 Marks)**

b. Describe the generation of AM wave using square law modulator with mathematical analysis. **(08 Marks)**

c. The antenna current of an AM transmitter is 8 amps, when only the carrier is sent. But it increases to 8.93 amps, when the carrier is modulated by a single sine wave. Find the percentage modulation. Determine the antenna, when the percentage modulation changes to 0.8. **(06 Marks)**

3 a. What is Hilbert transformation? Derive the expression for impulse response of the Hilbert transformer. **(07 Marks)**

b. Write the canonical representation of band pass signal and derive the expression for time function of SSBSC waveform. **(08 Marks)**

c. Calculate the percentage power saving when the carrier and one of the sidebands are suppressed in an AM wave modulated to a depth of (i) 100% and (ii) 50%. **(05 Marks)**

4 a. With neat block diagram, explain the generation of VSB wave by phase discrimination method. **(07 Marks)**

b. Discuss envelope detection of VSB plus carrier. **(06 Marks)**

c. Explain the transmission of a number of independent signals over a single communication channel by modulating different carrier signals. **(07 Marks)**

PART – B

5 a. Explain the generation of wide band frequency modulated wave by Armstrong method. **(07 Marks)**

b. A 100 MHz carrier wave has a peak voltage of 5 volts. The carrier is frequency modulated by a sinusoidal modulating waveform of frequency 2 kHz such that the frequency deviation is 75 kHz. The modulated wave form passes through zero and is increasing at time $t = 0$. Write the expression for frequency modulated signal. **(05 Marks)**

c. Show that the spectrum of FM contains infinite number of side bands. **(08 Marks)**

6 a. With neat schematic and frequency response, explain the operation of balanced discriminator for demodulation of FM wave. **(07 Marks)**

b. With relevant mathematical analysis, explain reconstruction of message signal form FM wave by PLL. **(08 Marks)**

c. Discuss nonlinear effects in FM systems. **(05 Marks)**

7 a. What are the types of noise, which affect communication system? Explain thermal noise in detail. **(07 Marks)**

b. An amplifier operating over the frequency range of 450 kHz to 460 kHz is having a input resistance of 75 KΩ. If the temperature is 15°C, find:
   i) The rms noise voltage at the input to the amplifier.
   ii) The amplifier noise power.
   iii) Power spectral density. **(06 Marks)**

c. Discuss the noise factor of amplifiers in cascade and obtain the Friss formula. **(07 Marks)**

8 a. Show that the figure of Merit of SSBSC system is unity. **(08 Marks)**

b. Discuss threshold effect in FM receiving system. **(04 Marks)**

c. Explain in detail the pre-emphasis and de-emphasis in frequency modulation. **(08 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Microwaves & Radar

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Derive the transmission line equations by the method of distributed circuit theory. **(10 Marks)**

b. A 300 Ω line is terminated in a load of (600+j300) Ω operating at 600 MHz. Find the value of SWR and design a single stub matching system. **(10 Marks)**

2 a. Using Helmholtz equation, derive the field equations for TM mode in rectangular waveguide. **(10 Marks)**

b. What is circulator? Explain the working of a 4-port circulator using magic tees and write its S-matrix. **(10 Marks)**

3 a. What is GUNN diode? Explain LSA and TT modes. **(10 Marks)**

b. What are the difference between microwave transistor and TEDs? Give few examples. **(05 Marks)**

c. An IMPATT diode with nominal frequency 10 GHz has C_j = 0.5 pF, L_p = 0.5 nH and C_P = 0.3 pF at breakdown bias of 80 V and bias current 80 mA. The RF peak current is 0.65 A for $R_d = -2\,\Omega$. Find i) Resonant frequency ii) Efficiency. **(05 Marks)**

4 a. State and prove symmetric property of S-matrix. **(08 Marks)**

b. What are S-parameters? Explain the S-parameters for two port network. **(08 Marks)**

c. The S-parameters of a 2 port network are given by $S_{11} = 0.2\angle 0$, $S_{22} = 0.1\angle 0$, $S_{12} = 0.6\angle 90^\circ$ and $S_{21} = 0.6\angle 90^\circ$. Is the network reciprocal? Lossless? **(04 Marks)**

PART – B

5 a. What is attenuator? Derive its S-matrix. **(08 Marks)**

b. Write a note on: i) Phase shifter ii) Coupling loop. **(06 Marks)**

c. A 20 mW signal is fed into one of the collinear port 1 of a lossless H-plane T junction. Calculate the power delivered through each port when other ports are terminated in matched load. **(06 Marks)**

6 a. Write a note on lossless in the microstrip line. **(08 Marks)**

b. Explain co-planar strip lines and shielded strip line. **(06 Marks)**

c. A shielded strip line has the following parameters $\varepsilon_r = 2.56$, strip width = 25 mils, strip thickness = 14 mils and shield depth = 70 mils. Calculate: i) the k-factor ii) fringe capacitance iii) Impedance of the line. **(06 Marks)**

7 a. Derive the basic radar range equation. **(10 Marks)**

b. Write a note on: i) Origin of radar ii) Applications of radar. **(04 Marks)**

c. A 10 GHz radar has the following characteristics $P_t = 250\,kW$, Prf = 1500 PPS, pulse width = 0.8 μs, power gain of antenna = 2500, $S_{min} = 10^{-14}$ W, A_e = 10 m^2, $\sigma = 2\ m^2$. Find i) R unambiguous ii) Maximum possible range iii) Duty cycle iv) Average power. **(06 Marks)**

8 a. What is blind speed? How can we eradicate it? **(08 Marks)**

b. Explain digital MTI processing. **(08 Marks)**

c. A CW radar operates at a frequency of 10 GHz. What is the Doppler frequency produced by i) an aeroplane plying at a speed of 250 kmph ii) a man crawling at 2.5 cm/sec. What do you understand? **(04 Marks)**

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10EC55

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

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. A binary source produces Symbols 0 and 1 with probability P and 1 – P. Determine the entropy of this source and sketch the variation of the entropy with P. **(05 Marks)**

b. Prove that the information content of N independent message is additive. **(05 Marks)**

c. For mark off source shown Find the source entropy and G_1, G_2 and G_3

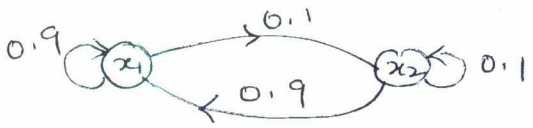


Fig. Q1(c)

$P(x_1) = 0.8$
$P(x_2) = 0.2$

(10 Marks)

2 a. For the state diagram shown find
i) State probabilities ii) Entropy of each state iii) Entropy of the source. **(10 Marks)**

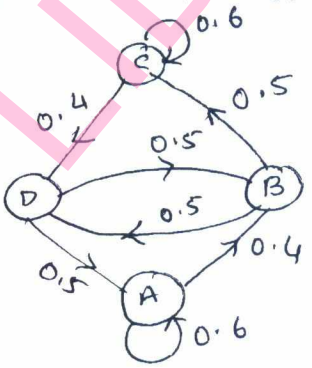


Fig. Q2(a)

b. The joint probability matrix of a channel is given. Compute H(x), H(y), H(xy), H(x/y) and H(y/x)

$$p(xy) = \begin{pmatrix} 0.05 & 0 & 0.2 & 0.05 \\ 0 & 0.1 & 0.1 & 0 \\ 0 & 0 & 0.2 & 0.1 \\ 0.05 & 0.05 & 0 & 0.1 \end{pmatrix}$$

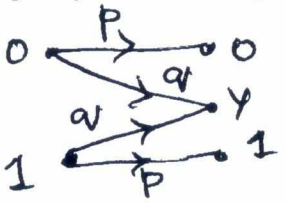
(10 Marks)

3 a. Prove the identities :
i) $H(x, y) = H(x) + H(y)$
ii) $H(xy) = H(x) + H(y/x)$ **(08 Marks)**

b. A source emits symbols with probabilities 0.4, 0.2, 0.12, 0.08, 0.08, 0.08, 0.04. Construct a binary Huffman code and Shannon Fano code. Calculate efficiency in both cases. **(12 Marks)**

4 a. Derive the expression for channel capacity for the binary channel shown **(08 Marks)**

Fig. Q4(a)



b. Define mutual information and explain its properties. **(04 Marks)**

c. An analog signal has a bandwidth of 4KHz. The signal is sampled at 2.5times the Nyquist rate and each sample is 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 error over a channel of Bandwidth 50KHz and S/N = 20db.

iii) If the output of this source is to be transmitted without errors over an analog channel having S/N = 10. Compute the band width required. **(08 Marks)**

PART – B

5 a. Define hamming weight, hamming distance and minimum distance of linear block code. **(06 Marks)**

b. For a linear block code the syndrome is given by

$S_1 = r_1 + r_2 + r_3 + r_5$

$S_2 = r_1 + r_2 + r_4 + r_6$

$S_3 = r_1 + r_3 + r_4 + r_7$

i) Find the generator matrix

ii) Draw the encoder and decoder circuit

iii) How many errors can it detect and correct **(14 Marks)**

6 a. A (7, 4) binary cyclic code has a generator polynomial $g(x) = 1 + x + x^3$

i) Write the syndrome circuit

ii) Verify the circuit for the message polynomial $d(x) = 1 + x^3$, showing the contents of the register for each state. **(08 Marks)**

b. A (15, 5) binary cyclic code has a generator polynomial $g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$

i) Draw the encoder block diagram

ii) Find the code polynomial for message polynomial $d(x) = 1 + x^2 + x^4$ in systematic form

iii) Is $V(x) = 1 + x^4 + x^6 + x^8 + x^{14}$ a code polynomial? If not, find the syndrome of V(x) **(12 Marks)**

7 Explain :

a. BCH code

b. Golay code

c. Reed Solomon codes

d. Golay codes. **(20 Marks)**

8 Consider the 3, 1, 2 convolution code with $g^{(1)} = 110$, $g^{(2)} = 101$ and $g^{(3)} = 111$

i) Draw the encoder block diagram

ii) Find the generator matrix

iii) Find the code word corresponding to the message sequence (11101) using both time domain and frequency domain approach. **(20 Marks)**

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10EC56

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer FIVE full questions, selecting at least TWO questions from each part.***
2. ***Assume missing data, if any.***

PART – A

1 a. Explain with a neat diagram, enhancement mode transistor action of MOS transistor. **(08 Marks)**

b. Using neat diagram, describe fabrication steps for n-MOS transistor. **(08 Marks)**

c. Compare CMOS and Bipolar technologies. **(04 Marks)**

2 a. What do you mean by Lambda (λ) based design rule? Explain, indicate and draw design rule for PMOS, CMOS and n-mos. **(12 Marks)**

b. Using CMOS logic draw schematic and Layout diagram for $Y = \overline{AB + CD}$. **(08 Marks)**

3 a. Explain why p-MOS and n–MOS has been used in CMOS complementary logic. Discuss CMOS complementary logic with an example. **(06 Marks)**

b. Describe the following logic structures with an example.
i) Pseudo – n-MOS logic
ii) Dynamic CMOS logic **(10 Marks)**

c. Using Bi-CMOS logic structure design a schematic circuit for $h = \overline{ab + c}$. **(04 Marks)**

4 a. What is sheet resistance? Derive the expression for sheet resistance. **(08 Marks)**

b. Explain delay unit. **(06 Marks)**

c. Discuss the scaling factors for n-MOS transistor. **(06 Marks)**

PART – B

5 a. Discuss the architectural issues of CMOS subsystem design. **(04 Marks)**

b. Explain combinational logic using a parity generator. **(08 Marks)**

c. Explain: i) Dynamic register element ii) Dynamic shift register. **(08 Marks)**

6 a. Design and explain 4bit shifter using 4 × 4 cross bar and barrel shifter. **(12 Marks)**

b. Explain with a neat diagram 4 – bit serial – parallel multiplier. **(08 Marks)**

7 a. Explain with a neat diagram, a three transistor dynamic RAM cell. **(08 Marks)**

b. Explain CMOS Pseudo – static memory cell using circuit and stick diagram. **(12 Marks)**

8 a. Discuss the floor plan and layout using 4 – bit processor. **(08 Marks)**

b. Write a short note on
i) Built – in – self – test (BIST)
ii) Scan design technology. **(12 Marks)**

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