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10AL51

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Management & Entreprenueurship

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Give an example for each of the managerial functions and explain the same. **(10 Marks)**
b. Explain any five principles of management as formulated by Fayol. **(10 Marks)**

2 a. List and explain the steps in planning. **(10 Marks)**
b. List any five types of plans and explain each briefly. **(10 Marks)**

3 a. What is span of control and what factors affect it? Explain. **(10 Marks)**
b. Explain recruitment and selection. What is MBO and MBE? **(10 Marks)**

4 a. How does Maslow's heirarchy of needs help a manager to motivate his subordinates? Explain. **(10 Marks)**
b. List Hygience and motivation factors as per Herzberg and explain their implications. **(10 Marks)**

PART – B

5 a. List the stages of entrepreneur process and expalin any one of them. **(10 Marks)**
b. List the characteristics of an entrepreneur and explain any one of them. **(10 Marks)**

6 a. List the characteristics of small scale industry (SSI) and explain the need for SSI in the economy of a country. **(10 Marks)**
b. What are the steps involved in starting SSI? Explain one of them. **(10 Marks)**

7 a. List some state level agencies which support SSI and explain one of them as to how they assist the SSIs. **(10 Marks)**
b. What are the schemes of finance provided by SIDBI? Explain one of the schemes. **(10 Marks)**

8 Write notes on:
a. Market feasibility study
b. Financial feasibility study.
c. Technical feasibility study.
d. Economic feasibility study. **(20 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015

Digital Signal Processing

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. State and prove the relationship between z-transform and DFT. **(06 Marks)**

b. Determine N point DFT of $x(n) = \cos\frac{2\pi K_o n}{N}$, $0 \le K \le N-1$. **(06 Marks)**

c. Find the IDFT of X(K) = {255, 48.63 + j166.05, -51+j102, -78.63+j46.05, -85, -78.63-j46.05, -51-j102, 48.63 – 166j}. **(08 Marks)**

2 a. State and prove the following properties:
i) Symmetry property
ii) Parseval's theorem **(08 Marks)**

b. Prove: i) Symmetry and ii) Periodicity property of a twiddle factor. **(04 Marks)**

c. Find the output y(n) of a filter whose impulse response is h(n) = {1, 2, 3, 4} and the input signal to the filter is x(n) = {1, 2, 1, -1, 3, 0, 5, 6, 2, -2, -5, -6, 7, 1, 2, 0, 1}. Using overlap – add method. [Use 6 point circular convolution]. **(08 Marks)**

3 a. Determine $y(n) = x_1(n) \circledast x_2(n)$, given $x_1(n) = n + 1$, $0 \le n \le 5$ and $x_2(n) = \cos\pi n$, $0 \le n \le 5$. Using Stockhalm's method. **(10 Marks)**

b. Develop DIT FFT algorithm and write signal flow graph for N = 8. **(08 Marks)**

c. Explain inplace computation of FFT. **(02 Marks)**

4 a. Explain bit reversal property used in FFT algorithm for N = 16. **(03 Marks)**

b. Develop DIT-FFT algorithm for N = 9. **(07 Marks)**

c. Find IDFT of X(K) = {36, -4+j9.7, -4+j4, -4+j1.7, -4, -4 – j1.7, -4 – j4, -4 – j9.7}. Using DIF FFT algorithm. Show clearly all the intermediate results. **(10 Marks)**

PART – B

5 a. Design a Chebyshev filter to meet the following specifications:
i) Pass band ripple ≤ 2 db
ii) Stop band attenuation ≥ 20 db
iii) Pass band edge : 1 rad/sec
iv) Stop band edge : 1.3 rad/sec **(10 Marks)**

b. Distinguish between IIR and FIR filters. **(04 Marks)**

c. Derive an expression for order of a low pass Butterworth filter. **(06 Marks)**

6 a. Realize FIR linear phase filter for N to be even. **(08 Marks)**

b. Evaluate the impulse response for input $x(n) = \delta(n)$ of three stage lattice structure having coefficients $K_1 = 0.65$, $K_2 = -0.34$ and $K_3 = 0.8$. Also draw its direct form – I structure. **(12 Marks)**

7 a. Explain how an analog filter is mapped on to a digital filter using impulse invariance method. What are the limitations of the method? **(10 Marks)**

b. Obtain direct form – I and lattice structure for the system described by the difference equation $y(n) = x(n) + \frac{2}{5}x(n-1) + \frac{3}{4}x(n-2) + \frac{1}{3}x(n-3)$. **(10 Marks)**

8 a. For the desired frequency response

$$H_d(\omega) = \begin{cases} e^{-j3\omega}, & -\frac{3\pi}{4} < \omega < \frac{3\pi}{4} \\ 0, & \frac{3\pi}{4} < |\omega| < \pi \end{cases}$$

find $H(\omega)$ for $N = 7$ using Hanning window. **(10 Marks)**

b. Show that for $\beta = 0$, Kaiser window becomes a rectangular window. **(05 Marks)**

c. Mention few advantages and disadvantages of windowing technique. **(05 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Analog Communications

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Show that the area under PDF curve is always equal to unity. **(05 Marks)**

b. Explain cross correlation functions. Give the properties of cross correlation function. **(07 Marks)**

c. A three digit message is transmitted over a noisy channel having a probability of error $P(E) = \frac{2}{5}$ per digit. Find out the corresponding CDF. **(08 Marks)**

2 a. Explain the generation of AM wave using square-law modulator along with relevant diagrams and analysis. **(07 Marks)**

b. With a neat block diagram, explain the balanced modulator method of generating DSB-SC wave. **(07 Marks)**

c. Consider a message signal $m(t) = 20 \cos(2\pi t)$ volts and a carrier signal is $c(t) = 50 \cos(100\pi t)$ volts.

i) Sketch to scale resulting AM wave for 75% modulation.

ii) Find the power delivered across a load of 100Ω due to this AM wave. **(06 Marks)**

3 a. Define: i) Hilbert transform; ii) Pre-envelope. **(08 Marks)**

b. With a neat diagram, explain how SSB wave is generated using phase discriminator method with only USB and rejecting the LSB. **(08 Marks)**

c. Find the Hilbert transform of a signal $x(t) = \cos 2\pi f_1 t \sin 2\pi f_2 t$ where f_2 is message signal and f_1 is carrier signal. **(04 Marks)**

4 a. Explain with relevant equations the working of envelope detection of USB wave plus carrier. **(06 Marks)**

b. With a neat block diagram, explain the working of FDM technique. **(07 Marks)**

c. Write the block diagram of super heterodyne receiver and specify the importance of IF value in the receiver. List the advantages of such receivers. **(07 Marks)**

PART – B

5 a. Derive the equation for FM wave. Define modulation index, maximum deviation and band width of a FM signal. **(08 Marks)**

b. Explain FM generation using direct method. **(07 Marks)**

c. An FM wave is defined by $s(t) = 10 \cos(2 + \sin(6\pi t))$. Find the instantaneous frequency of S(t). **(05 Marks)**

6 a. Explain the working of a balanced slope detector used for FM demodulation. **(07 Marks)**
b. Explain FM demodulation using zero crossing detectors. **(05 Marks)**
c. With a neat block diagram, explain the working of FM stereo multiplexing and demultiplexing. **(08 Marks)**

7 a. What is noise equivalent bandwidth? Derive an expression for the same. **(08 Marks)**
b. Derive Friiss formula for amplifiers connected in cascade. **(08 Marks)**
c. An amplifier with 10dB nose figure and 4dB power gain is cascaded. With a second amplifier has a 10dB power gain and 10dB noise figure. What is the overall noise figure and power gain? **(04 Marks)**

8 a. Derive the equation for output signal to noise ratio for a DSB-SC system. **(07 Marks)**
b. Explain the working of pre-emphasis and de-emphasis in FM. **(06 Marks)**
c. Show that the signal to noise ratio of the output for a single tone FM is given by $SNR_o = \frac{3E_c^2(mf)^2}{4\ No\ W}$ where the symbols have usual notations. **(07 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Microwaves and Radar

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define reflection coefficient. Derive the equation for reflection coefficient at the load end and at a distance 'd' from load end. **(10 Marks)**

b. A transmission line has the following primary constants per km of the line R = 8Ω, G = 0.1μ℧, L = 3.5mH, C = 9nF. Calculate zo, α, β, u_p and γ at w = 5000 rad/sec. **(05 Marks)**

c. A transmission line and characteristic impedance of 50 + j0.01Ω and is terminated in a load impedance of 73 – j42.5Ω. Calculate: i) the reflection coefficient; ii) Standing wave ratio. **(05 Marks)**

2 a. Derive electric and magnetic field equation in rectangular wave guides for TE modes. **(12 Marks)**

b. Write a brief note on dominant mode and degenerate mode. **(04 Marks)**

c. An air-filled rectangular waveguide of inside dimensions 7 × 3.5cm operates in the dominant TE_{10} mode. Find cutoff frequency, phase velocity, guided wavelength of the wave in the guide at a frequency of 3.5 GHz. **(04 Marks)**

3 a. Mention the four modes of operation for Gunn diode. Explain briefly the Gunn oscillation mode. **(10 Marks)**

b. Draw the equivalent circuit for parametric amplifier and explain in brief the parametric up converter. **(05 Marks)**

c. Explain the principle of operation of read diode with suitable diagram. **(05 Marks)**

4 a. State the properties of S-parameter. Prove the symmetry property and unitary property of S parameter. **(10 Marks)**

b. Explain S-matrix representation of multiport network. **(06 Marks)**

c. Define the following losses in microwave network in terms of S parameter:
i) Insertion loss ii) Transmission loss. **(04 Marks)**

PART – B

5 a. Explain with a neat sketch a precision type variable attenuator. **(06 Marks)**

b. Explain magic tee and derive the S-matrix and mention its application. **(10 Marks)**

c. Write a brief note on phase shifter. **(04 Marks)**

6 a. Explain the construction and field pattern for micro strip line. **(08 Marks)**

b. What are the losses in microstrip lines? Explain radiation losses. **(08 Marks)**

c. Compare strip line and microstrip line. **(04 Marks)**

7 a. Derive an expression for simple form of the radar range equation. **(08 Marks)**

b. A ground based radar operates at 3cm. The radar transmitter using an antenna of gain 50dB produces 100kW. The receiver minimum detectable signal is $S_{min} = 10^{-13}$W. The maximum radar range is given as 259km. Find the cross section of the target the radar can detect. **(08 Marks)**

c. Write a brief note on maximum unambiguous range. **(04 Marks)**

8 a. With a neat diagram, explain the advantage of I and Q channels in digital MTI Doppler signal processor. **(06 Marks)**

b. Explain the principle and working of MTI radar with the help of block diagram. **(10 Marks)**

c. Explain single delay line canceller with neat block diagram. Derive an expression for frequency response of single DLC. **(04 Marks)**

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10EC55

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
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. For the given first order Markov source in Fig. Q1 (a) shown find i) State probabilities ii) Entropy of each state iii) Entropy of the source iv) Find G_1, G_2. **(10 Marks)**

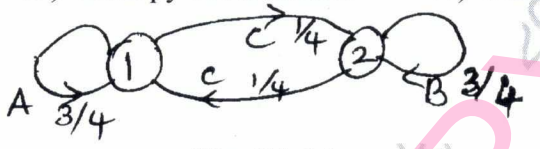

Fig. Q1 (a)

b. A black and white TV picture consists of 526 lines of picture information. Assume that each line consists of 526 picture elements (pixels) and that each can have 255 brightness levels. Picture is repeated at the rate of 30 frames / sec. Calculate the average rate of information conveyed by a TV set to a viewer. **(04 Marks)**

c. Define (i) Self information (ii) Entropy
(iii) Rate of information (iv) Mutual information. **(06 Marks)**

2 a. A BSC channel has the following noise matrix with source probabilities:

$$P(X_1) = \frac{2}{3} \quad \text{and} \quad P(X_2) = \frac{1}{3}$$

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

Determine : i) H(X), H(Y), H(X, Y), $H\left(\frac{Y}{X}\right)$, $H\left(\frac{X}{Y}\right)$ and I(X, Y)

ii) Channel capacity C.

iii) Channel efficiency and redundancy. **(10 Marks)**

b. Show that $H(X, Y) = H\left(\frac{X}{Y}\right) + H(Y)$. **(04 Marks)**

c. For the given channel matrix. Calculate H(X), H(Y) and channel capacity $P(X_1) = 0.6$, $P(X_2) = 0.3$ and $P(X_3) = 0.1$

$$P\left(\frac{Y}{X}\right) = \begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & \frac{1}{2} & \frac{1}{2} \end{bmatrix}.$$ **(06 Marks)**

3 a. Explain the properties of mutual information and also prove that mutual information is non negative. **(06 Marks)**

b. For an AGWN channel with 4 kHz BW and noise spectral density $\frac{N_0}{2} = 10^{-12}$ W/Hz. The signal power required at the reciver is 0.1 mW. Calculate the capacity of the channel. **(04 Marks)**

c. Given the source: S = $\{S_1, S_2, S_3, S_4, S_5, S_6, S_7\}$ with probabilities,
P = {0.1, 0.2, 0.1, 0.4, 0.1, 0.05, 0.05} respectively.
Find :
i) H(s) and $H(s^3)$
ii) Find a compact Huffman binary code by placing composite symbol as low as possible.
iii) Find a compact Huffman binary code by placing composite symbol as high as possible.
iv) Find the average length, efficiency, redundancy, decision tree diagram for both the above codes. **(10 Marks)**

4 a. Explain Shannon Hartley law on channel capacity without proof. **(05 Marks)**

b. Find the mutual information and the channel capacity of the channel shown in Fig. Q4 (b). $P(X_1) = 0.6$ $P(X_2) = 0.4$ **(10 Marks)**

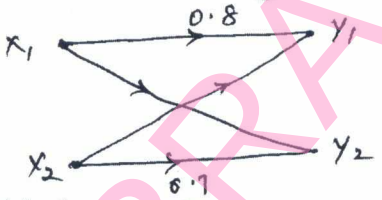

Fig.Q4 (b)

c. A Gaussian channel has 10 MHz BW if $\left(\frac{S}{N}\right)$ ratio is 100. Calculate channel capacity and maximum information rate. **(05 Marks)**

PART – B

5 a. For a systematic (6, 3) linear block code the parity matrix, $P = \begin{matrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{matrix}$

i) Find all possible code vectors.
ii) Find the minimum weight of the code.
iii) Find the parity check matrix.
iv) For a received code vector R = 1 1 0 0 1 0
detect and correct error that has occurred due to noise. **(10 Marks)**

b. Define the terms: i) Burst error ii) Systematic linear block code
iii) Galois field iv) Hamming weight **(04 Marks)**

c. What are different methods of controlling errors? Explain. **(06 Marks)**

6 a. For the [7, 4] single error correcting cyclic code. $D(X) = d_0 + d_1X + d_2X^2 + d_3X^3$ and $X^n + 1 = X^7 + 1 + (1 + X + X^3)(1 + X + X^2 + X^4)$ using generator polynomial $g(X) = (1 + X + X^3)$. Find all 16 code vector of cyclic code both in non systematic and systematic form. **(10 Marks)**

b. What is binary cyclic code? Describe the features of encoder and decoder used for cyclic codes using an (h-K) bit shift register. **(10 Marks)**

7 a. Determine the parameters of q-ary RS code over GF(256) for $d_{min} = 33$. **(05 Marks)**

b. Consider a (15, 9) cyclic code generated by $1 + X^3 + X^4 + X^5 + X^6$. This code has burst error correcting ability b = 3. Find the burst error correcting efficiency of this code. **(05 Marks)**

c. Write short note on:

i) Golay codes.

ii) RS codes. **(10 Marks)**

8 a. What are convolution codes? How is it different from block codes? **(06 Marks)**

b. For the convolution encoder, $g^{(1)} = 111$, $g^{(2)} = 101$

i) Draw the encoder block diagram.

ii) Find generator matrix.

iii) Find code word corresponding to information sequence 10011 using time domain and transform domain. **(10 Marks)**

c. Write a note on Trellis diagram. **(04 Marks)**

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10EC56

Fifth Semester B.E. Degree Examination, Dec.2014/Jan.2015
Fundamentals of CMOS VLSI

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 nMOS enhancement mode transistor operation for different values of V_{gs} and V_{ds}. **(10 Marks)**

b. Explain the CMOS inverter transfer characteristics highlighting the regions of operations of the MOS transistor. **(10 Marks)**

2 a. Draw the circuit and stick diagram for the nMOS and CMOS implementation of the Boolean expression $y = \overline{AB + CD}$. **(10 Marks)**

b. With neat diagram, explain λ based design rules for wired (nMOS and CMOS) and transistor design rules (nMOS PMOS and CMOS). **(10 Marks)**

3 a. Explain the differences between CMOS complementary logic and BICMOS logic. **(08 Marks)**

b. Explain the following: i) Dynamic logic; ii) Clocked CMOS logic. **(12 Marks)**

4 a. Provide scaling factors for:
i) Saturation current.
ii) Current density.
iii) Power dissipation/unit area.
iv) Maximum operating frequency. **(10 Marks)**

b. Discuss the following in scaling of MOS circuits:
i) Limits of miniaturaization.
ii) Limits of interconnect and contact resistance. **(10 Marks)**

PART – B

5 a. Discuss the architectural issues related to sub system design. **(08 Marks)**

b. Explain switch logic (nMOS and CMOS) implementation for 4-way multiplexer. **(12 Marks)**

6 a. Discuss the general arrangements of a 4-bit arithmetic processor. **(12 Marks)**

b. Explain 4 × 4 barrel shifter with neat diagram. **(08 Marks)**

7 a. Explain 3-transistor dynamic RAM-cell. **(10 Marks)**

b. Explain write operation, read operation for four transistor dynamic and six transistor static CMOS memory cell. **(10 Marks)**

8 a. Explain the scan design techniques. **(10 Marks)**

b. Write a note on testability and testing. **(10 Marks)**

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