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10AL51

Fifth Semester B.E. Degree Examination, June/July 2018
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 term management and discuss the functions of management. **(08 Marks)**
b. Explain modern management approaches. **(12 Marks)**

2 a. Explain the steps involved in planning process with an example. **(08 Marks)**
b. Explain the hierarchy of plans of a organization. **(12 Marks)**

3 a. Explain with a block diagram line and matrix type of organization. **(08 Marks)**
b. Explain the principles of organization. **(12 Marks)**

4 a. Explain the requirements of effective direction. **(06 Marks)**
b. Explain Maslaw's hierarchy of needs theory. **(08 Marks)**
c. Differentiate between co-ordination and cooperation. **(06 Marks)**

PART – B

5 a. Explain the concept of entrepreneurship and its evolution. **(08 Marks)**
b. Explain the types of entrepreneur. **(12 Marks)**

6 a. Explain the characteristics of small enterprises. **(08 Marks)**
b. Explain the advantages of small enterprises. **(12 Marks)**

7 a. Explain the activities of Karnataka Industrial Area Development Board (KIADB). **(10 Marks)**
b. Explain the activities of Karnataka State Small Industries Development Corporation (KSSIDC). **(10 Marks)**

8 Explain various details which should be included in a project work. **(20 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, June/July 2018
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. Derive the DFT expression from the DTFT expression. **(06 Marks)**

b. Compute 5-point DFT of x(n) = {1, 1, 1}. **(07 Marks)**

c. Find IDFT for the sequence, X(K) = {5, 0, (1-j), 0, 1, 0, (1+j), 0} **(07 Marks)**

2 a. State and prove circular time shift and frequency shift property of DFT. **(05 Marks)**

b. Determine N-point circular correlation of $x_1(n)$ and $x_2(n)$, given $x_1(n) = \cos\frac{2\pi}{N}n$ and $x_2(n) = \sin\frac{2\pi}{N}n$. **(08 Marks)**

c. Compute circular convolution of x(n) = {1, 2, 3, 4} and h(n) = {1, 2, 2} using time domain approach. **(07 Marks)**

3 a. Find the output y(n) of a filter whose impulse response 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. **(08 Marks)**

b. Find 4-point DFT of two real sequences using a single 4-point DFT, given g(n) = {1, 2, 0, 1} and h(n) = {2, 2, 1, 1}. **(08 Marks)**

c. State and prove (i) Symmetry and (ii) Periodicity property of a twiddle factor. **(04 Marks)**

4 a. Develop Radix-2, DITFFT algorithm to compute DFT of a sequence, draw the signal flow graph, for N = 8. **(08 Marks)**

b. Obtain 8-point DFT of a sequence $x(n) = (n+1)[u(n) - u(n-8)]$, using DIF-FFT algorithm, show all the intermediate results. **(08 Marks)**

c. Write a note on Geortzal algorithm. **(04 Marks)**

PART – B

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

b. Design an analog Chebyshev filter having following specifications:
(i) Passband ripple of 3 dB at 500Hz.
(ii) Attenuation of 15 dB at 750 Hz. **(10 Marks)**

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

6 a. Obtain the cascade and parallel form realization of,

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

b. A FIR filter is described by Transfer function, $H(z) = 1 + \frac{2}{5}z^{-1} + \frac{3}{4}z^{-2} + \frac{1}{3}z^{-3}$,

(i) Draw Lattice structure.
(ii) Obtain its difference equation.
(iii) Draw Direct form structure. **(10 Marks)**

7 a. Derive an expression for frequency response of a symmetric FIR filter, for N = odd. **(08 Marks)**

b. Design a LPF with the frequency response, $H_d(j\omega) = \begin{cases} e^{-j2\omega}, & |\omega| < \frac{\pi}{4} \\ 0, & \frac{\pi}{4} < |\omega| < \pi \end{cases}$

using rectangular window. Also find its impulse response and frequency response. **(08 Marks)**

c. Explain the frequency sampling design of FIR filters. **(04 Marks)**

8 a. Derive the expression for the bilinear transformation, to transform an analog filter to digital filter, explain the characteristics of mapping from s-plane to z-plane. **(08 Marks)**

b. Given the analog transfer function, $H(z) = \frac{s+2}{(s+1)(s+3)}$, find H(z) using matched z-transform. **(04 Marks)**

c. Design a digital lowpass filter using Bilinear transformation to satisfy the following characteristics:

(i) Monotonic stopband and passband.

(ii) -3 dB cutoff frequency of 0.5π rad.

(iii) Magnitude down atleast 15 dB at 0.75π rad. **(08 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, June/July 2018
Analog Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. What is Gaussian process? Mention the properties of Gaussian process. **(06 Marks)**

b. Define mean, correlation and co-variance of random process x(t). **(06 Marks)**

c. Let x have the uniform distribution given by

$$f_x(x) = \frac{1}{2\pi} \quad 0 \le x \le 2\pi$$

$$0 \quad \text{elsewhere}$$

Calculate mean, mean square value, variance and standard deviation. **(08 Marks)**

2 a. Explain generation of an AM wave using a switching modulator with mathematical equation. **(08 Marks)**

b. The output voltage of a transmitter is given by $300(1 + 0.3 \sin 5210t) \sin (2.14 \times 10^7 t)$. This voltage is fed to a load of 500Ω resistance. Determine : i) carrier frequency ii) modulating frequency iii) total power output iv) carrier power. **(06 Marks)**

c. With the help of block diagram, explain Costas receiver, which is used for de-modulating DSB-SC singles. **(06 Marks)**

3 a. Explain the generation of SSB-SC wave using phase discrimination method with mathematical proof. **(08 Marks)**

b. Find the Hilbert transform of the pulse given below, **(06 Marks)**

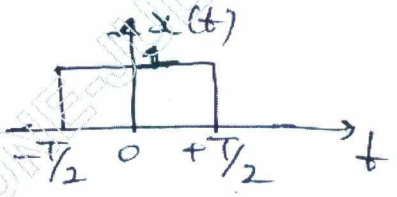

Fig.Q3(b)

c. Define Hilbert transform, pre-envelope and complex envelope. **(06 Marks)**

4 a. Show that a VSB modulated wave s(t) containing a vestiage of the lower side band is defined by $s(t) = \frac{A_c}{2} m_I(t) \cos\omega_c t - \frac{A_c}{2} m_Q(t) \sin\omega_c t$. **(06 Marks)**

b. Explain the concept of frequency translation with frequency spectrum. **(06 Marks)**

c. Give a comparison of amplitude modulation techniques. **(08 Marks)**

PART – B

5 a. Explain the generation of FM using VCO method. **(07 Marks)**

b. Find the instantaneous frequency in hertz of each of the following signals.

i) $10 \cos (200\pi t + \pi/3)$

ii) $10 \cos (20\pi t + \pi t^2)$

iii) $\cos 200\pi t \cos(5\sin 2\pi t) + \sin 200\pi t \sin (5 \sin 2\pi t)$. **(06 Marks)**

c. Compare wideband and narrowband FM systems. **(07 Marks)**

6 a. With relevant mathematical expression, explain PLL detection using non-linear model. **(07 Marks)**

b. In a broadcast super-heterodyne receiver, having no RF amplifier, the loaded 'Q' of the antenna coupling circuit is 100. If the intermediate frequency is 455KHz. Calculate the image frequency and its rejection ratio for tuning at 2000KHz. **(06 Marks)**

c. With neat block diagram discuss FM stereo multiplexing and de-multiplexing system. **(07 Marks)**

7 a. Derive the expression for noise factor of two amplifiers connected in cascade. **(08 Marks)**

b. Define and derive equivalent noise temperature with cascade connection of amplifiers. **(06 Marks)**

c. A mixer stage has a noise figure of 20dB. It is preceded by an amplifier, which has a noise figure of 9dB and an available power gain of 15dB. Calculate the overall noise figure referred to the input. **(06 Marks)**

8 a. Discuss the noise in DSB-SC receiver with a model receiver using coherent detection. Prove that the figure of merit for such a receiver is unity? **(12 Marks)**

b. Explain the concept of pre-emphasis and de-emphasis in FM system. **(08 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, June/July 2018
Microwave and 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. What are distributed parameters of a Transmission line? Derive characteristic impedence (Z_0) and propagation constant for a microwave transmission line. **(06 Marks)**

b. Derive the expression for input impedance of a transmission line terminated with a load impedance of Z_l. **(06 Marks)**

c. A line of $R_0 = 400\ \Omega$ is connected to a load impedance of $200 + j300\ \Omega$, which is excited by a matched generator at 800 MHz. Find the location and length of a single stub nearest to the load to produce an impedance match. **(08 Marks)**

2 a. Derive electric and magnetic field components for TE modes in rectangular waveguide. **(08 Marks)**

b. With neat sketches, explain directional coupler and derive its s-matrix. **(08 Marks)**

c. Explain rectangular microwave cavity resonators with necessary diagrams and expressions. **(04 Marks)**

3 a. Explain RWH theory with reference to the Gunn diode operation. **(08 Marks)**

b. Describe the operating principle of IMPATT diode and obtain the expressions for output power and efficiency. **(08 Marks)**

c. An M-Si-M BARITT diode has the following parameters :
Relative dielectic constant of S_i : $\epsilon_r = 11.8$
Donor concentration : $N = 3 \times 10^{21}\ m^{-3}$
S_i length : $L = 6.2\ \mu m$
Calculate : (i) breakdown voltage
(ii) breakdown electric field **(04 Marks)**

4 a. Describe the properties of s-matrix. **(08 Marks)**

b. Prove that impedances and admittances are symmetrical for a Reciprocal network. **(06 Marks)**

c. The S-parameters of a two-port network are given by, $S_{11} = 0.2\angle 0^0$, $S_{22} = 0.1\angle 0^0$, $S_{12} = 0.6\angle 90^0$, $S_{21} = 0.6\angle 90^0$ (i) Prove that the network is reciprocal but not lossless (ii) Find the return loss at Port 1 when Port 2 is short circuited. **(06 Marks)**

PART – B

5 a. Obtain the S-matrix for a Magic-T and explain its applications. **(10 Marks)**

b. With neat sketches, explain the operation of precision type variable attenuator. **(06 Marks)**

c. A 20 mW signal is fed into one of the collinear ports 1 of a lossless H-plane Tee. Calculate the power delivered through each port when other parts are terminated in matched load. **(04 Marks)**

6 a. Explain various lossless in strip lines. **(08 Marks)**

b. Describe parallel strip lines and express distributed parameters in terms of strip line dimensions. **(08 Marks)**

c. A shielded strip line has the following parameters: Dielectric constant of insulator, $\epsilon_r = 2.56$, strip width W = 25 mils, Strip thickness t = 14 mils, shield depth d = 70 mils. Calculate (i) The K factor (ii) The fringe capacitance (iii) The characteristic impedance. **(04 Marks)**

7 a. Derive simple form of Radar range equation. **(08 Marks)**

b. Describe the various applications of Radar. **(06 Marks)**

c. A Radar operating at 3 GHz is radiating power of 200 kW. Calculate the power of the reflected signal at the Radar with a 20 m^2 target at 5.56 km. Given $A_e = 9\,m^2$. **(06 Marks)**

8 a. With a neat block diagram explain M.T.I Radar. **(07 Marks)**

b. What are delay line cancellers? Explain. **(07 Marks)**

c. A 3.25 cm pulse Doppler RADAR has a pulse repition frequency of 4000PPS. Find (i) Maximum unambiguous range. (ii) Maximum Doppler frequency shift and (iii) Maximum radial velocity of the target. **(06 Marks)**

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10EC55

Fifth Semester B.E. Degree Examination, June/July 2018
Information Theory and Coding

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define :
   i) Self information
   ii) Rate of source
   iii) Entropy of source. **(06 Marks)**

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

c. The state diagram of Markov source is given in Fig.Q1(c) : $P_i = \frac{1}{3}$; for i = 1, 2, 3
   i) Find the entropy of each state H_i(i = 1, 2, 3)
   ii) Find entropy of the source H
   iii) Find G_1 and G_2 and show that $G_1 \geq G_2 \geq H$. **(10 Marks)**

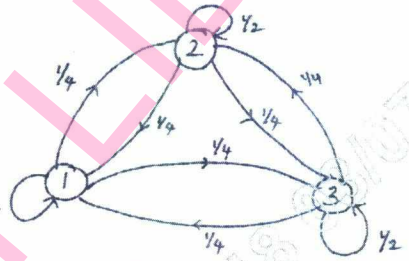

Fig.Q1(c)

2 a. Write Shannon's encoding algorithm. **(04 Marks)**

b. Apply Shannon's encoding algorithm to the following messages :

S_1	S_2	S_3
0.5	0.3	0.2

   i) Find code efficiency and redundancy
   ii) If the same technique is applied to the 2nd order extension of this source, how much will the code efficiency be improved? **(08 Marks)**

c. An analog has 4KHz bandwidth. The signal is sampled at 2.5 times the Nyquist rate and each sample is quantized into 256 equally likely levels. Assume that the successive samples are stastically independent :
   i) Find the information rate of this source
   ii) Can output of this source be transmitted without errors over a Guassian channel for bandwidth 50Hz and S/N ratio of 26dB
   iii) If the output of this source is to be transmitted without errors over an analog channel having S/N ratio of 16dB, compute the bandwidth requirement of the channels. **(08 Marks)**

3 a. Write Huffman encoding procedure for obtaining compact code with least redundancy. **(04 Marks)**

b. Given 8 symbols source with probabilities
P = {0.25, 0.20, 0.15, 0.15, 0.10, 0.05, 0.05, 0.05}
Construct two binary Huffman coding as described below :
i) Place the composite symbol as low as possible
ii) Place the composite symbol as high as possible
In each case determine the code word and efficiency. **(08 Marks)**

c. The noise characteristics of a channel is as shown in Fig.Q3(c). Find the channel capacity (Using Muroga's method). **(08 Marks)**

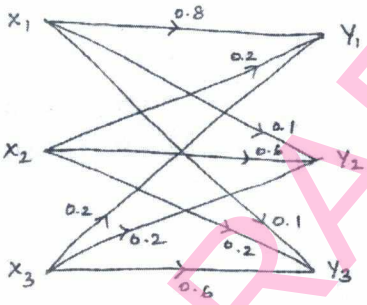

Fig.Q3(c)

4 a. List the properties of mutual information and prove the following :
i) I(X ; Y) = I(Y ; X)
ii) I(X ; Y) ≥ 0. **(08 Marks)**

b. Two noisy channels are cascaded whose channel matrix are given by :

$$P\left(\frac{y}{x}\right)=\begin{bmatrix} \frac{1}{6} & \frac{1}{6} & \frac{2}{3} \\ \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \end{bmatrix}, \quad P\left(\frac{z}{y}\right)=\begin{bmatrix} \frac{1}{2} & \frac{1}{2} & 0 \\ \frac{1}{3} & \frac{2}{3} & 0 \\ 0 & \frac{1}{3} & \frac{2}{3} \end{bmatrix}$$

With $P(x_1) = P(x_2) = \frac{1}{2}$. Find : i) I(x ; y) ii) I(x ; z). **(12 Marks)**

PART – B

5 a. What are the methods of controlling errors? Explain. **(04 Marks)**

b. Mention types of errors and explain. **(04 Marks)**

c. The parity check bits of a (7, 4) Hamming code are generated by :

$C_5 = d_1 \oplus d_3 \oplus d_4$

$C_6 = d_1 \oplus d_2 \oplus d_3$

$C_7 = d_2 \oplus d_3 \oplus d_4$

Where d_1, d_2, d_3 and d_4 are message bits.
i) Find generator matrix [G] and parity check matrix[H]
ii) Prove that $GH^T = 0$
iii) The (n, k) linear block code so obtained has a dual code. This dual code is a (n, n – k) code having a generator matrix H and parity check matrix G. Determine the eight code vectors of the dual code for (7, 4) Hamming code described above
iv) Find the minimum distance of the dual code determined in part(iii). **(12 Marks)**

6 a. Explain the operation of an encoder using (n, k) bit shift register. **(04 Marks)**

b. Design the encoder for the (7, 4) cyclic code generated by generator polynomial $G(P) = P^3 + P + 1$ and verify this operation for message vector M = 1100. **(04 Marks)**

c. For a systematic (7, 4) linear block code the parity matrix P is given by

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

i) Find all Possible valid code vectors

ii) Draw the corresponding encoding circuit

iii) A single error has occurred in each of this received vectors. Detect and correct those errors.

$Y_A = 0111110$

$Y_B = 1011100$

$Y_C = 1010000$

iv) Draw the syndrome calculation circuit. **(12 Marks)**

7 Write an explanatory note on following :

a. R.S codes

b. Golay codes

c. Shortened cyclic codes

d. Burst error correcting codes. **(20 Marks)**

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

a. Draw the encoder block diagram

b. Find generator matrix

c. Find the codeword corresponds to the message sequence 11101 using :

i) Time domain approach

ii) Transform domain approach. **(20 Marks)**

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10EC56

Fifth Semester B.E. Degree Examination, June/July 2018
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Briefly explain the speed / power performance of different technologies. **(04 Marks)**

b. Explain the different steps required for nMOS fabrication process. **(10 Marks)**

c. What is noise margin? Explain CMOS inverter noise margins. **(06 Marks)**

2 a. Explain λ based design rules applicable to wires and contacts. **(10 Marks)**

b. Write the stick diagram and layout for the Fig. Q2 (b). **(05 Marks)**

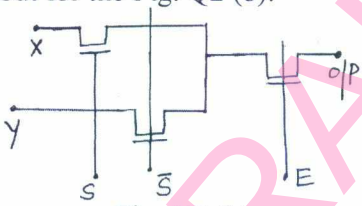

Fig. Q2 (b)

c. Write the layout for two input CMOS NAND gate. **(05 Marks)**

3 Explain the following logic structures with their salient features:
(i) Pseudo nMOS logic (ii) Dynamic CMOS logic
(iii) Clocked CMOS logic (iv) CMOS domino logic. **(20 Marks)**

4 a. Define sheet resistance and standard unit of capacitance. **(02 Marks)**

b. Explain propagation delays with respect to pass transistor chain and long polysilicon wires. **(08 Marks)**

c. Explain scaling factors as applicable to MOS device parameters. **(10 Marks)**

PART – B

5 a. Explain the concept of basic inverting dynamic storage cells and non inverting dynamic storage cells. **(05 Marks)**

b. Briefly explain the basic form of two phase clock generator circuit. **(05 Marks)**

c. Explain bus arbitration logic for n-line bus. **(10 Marks)**

6 a. Explain the concept of carry look ahead adder and represent the 4 bit block CLA unit. **(10 Marks)**

b. Discuss Baugh Wooley method used for two's complement multiplication. **(10 Marks)**

7 a. What are the timing considerations in system design? **(06 Marks)**

b. Explain the read and write operation of a three transistor dynamic RAM memory cell. **(06 Marks)**

c. Explain decoder based selection and control of the 4×4 bit register array. **(08 Marks)**

8 a. Explain input / output pads and represent the 4 bit processor pad utilization. **(10 Marks)**

b. With the help of example, explain sensitized path based testing a combinational logic. **(10 Marks)**

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