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10AL51

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Define management. List its characteristics. **(04 Marks)**
b. What are the various roles of a manager? Explain. **(06 Marks)**
c. Explain (i) Systems approach (ii) contingency approach to Management. **(10 Marks)**

2 a. Define the term planning. Explain steps involved in planning. **(10 Marks)**
b. List the importance and purpose of planning process. **(06 Marks)**
c. Explain MBO and MBE. **(04 Marks)**

3 a. List and explain principles of organization. **(10 Marks)**
b. Explain selection and recruitment process. **(10 Marks)**

4 a. Explain the following theories of motivation:
(i) Maslow's Hierarchy of needs theory (ii) McGregor's theory (iii) 2 factor theory **(12 Marks)**
b. List the techniques of coordination. **(08 Marks)**

PART – B

5 a. Classify Entrepreneurs by providing an example for each type. **(10 Marks)**
b. What role does an entrepreneur play in economic development of a country? **(10 Marks)**

6 a. Explain the steps to start a SSI. **(08 Marks)**
b. List the advantages of a SSI. **(05 Marks)**
c. Explain effect of WTO/GATT on SSI. **(07 Marks)**

7 Explain the nature of support and functions of TECKSOK, KIADB, NSIC and KSFC for an entrepreneur. **(20 Marks)**

8 a. Why should feasibility study be conducted? Explain various types of feasibility study. **(12 Marks)**
b. Explain contents of a Project Report. **(08 Marks)**

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10EC52

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019

Digital Signal Processing

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Find the DFT of $x(n) = \cos\omega_0 n$ where $\omega_0 = \frac{2\pi}{N} K_0$. **(05 Marks)**

b. Derive the relationship between DFT and Z.T. **(05 Marks)**

c. Find the DFT of the sequence

$$x(n) = \begin{cases} 1, & 0 \le n \le 2 \\ 0, & \text{otherwise} \end{cases}$$

for N = 8 and N = 4. Also plot magnitude and phase spectra. **(10 Marks)**

2 a. State and prove time reversal property of DFT. **(05 Marks)**

b. Find the circular convolution of the sequences $x_1(n) = \{\underset{\uparrow}{1}, 2, 3, 1\}$ and $x_2(n) = \{\underset{\uparrow}{4}, 3, 2, 2\}$ using concentric circles method. Verify the result using DFT-IDFT method. **(08 Marks)**

c. Let X(K) denote the 14 point DFT of a real valued sequence x(n) of length 14. First 8 samples of X(K) are given by X (0……7) = {12, -1-j3, 3+j4, 1-j5, -2+j2, 6+j3, -2-j3, 10}. Find the remaining samples of X(K) and also evaluate (i) x(0) (ii) x(7) (iii) $\sum_{n=0}^{13} x(n)$. **(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. Use overlap save method and assume the length of the block as 9. **(12 Marks)**

b. Briefly explain the necessity of FFT algorithms. What are the properties of twiddle factor used in FFT algorithms? **(08 Marks)**

4 a. Using DITFFT algorithm, find the DFT of the following sequence x(n) = {1, 2, 3, 4, 4, 3, 2, 1}. **(08 Marks)**

b. With necessary equations and block diagrams, briefly explain chirp-z transform and Goertzel algorithm. **(12 Marks)**

PART – B

5 a. Derive expressions for order and cut-off frequency of a Butterworth filter. **(10 Marks)**

b. Briefly discuss the design steps involved in the design of Cheybyshev filter (type-I). **(10 Marks)**

6 a. Obtain the cascade and parallel realization for the system function given by

$$H(z) = \frac{1 + \frac{1}{4}z^{-1}}{\left(1 + \frac{1}{2}z^{-1}\right)\left(1 + \frac{1}{2}z^{-1} + \frac{1}{4}z^{-2}\right)}$$

(08 Marks)

b. $H(z) = (1 + 0.6z^{-1})^5$. Realize H(z) in:
   i) direct form
   ii) As a cascade of first order sections only
   iii) As a cascade of first and second order sections only. **(08 Marks)**

c. Realize a linear phase FIR filter with $H(z) = 1 + \frac{1}{4}z^{-1} - \frac{1}{8}z^{-2} + \frac{1}{4}z^{-3} + z^{-4}$. **(04 Marks)**

7 a. A LPF is to be designed with the following desired frequency response

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

Determine the filter coefficients $h_d(n)$ and h(n) if a rectangular window is used. Also find the frequency response. **(10 Marks)**

b. Design a 17 tap linear phase FIR filter with a cut-off frequency $\omega_c = \frac{\pi}{2}$. The design is to be done based on frequency sampling technique. **(10 Marks)**

8 a. Find the T.F. of the digital filter using impulse invariance technique

$$H(s) = \frac{s+a}{(s+a)^2 + b^2}.$$ **(06 Marks)**

b. Determine the system function H(z) of a Chebyshev filter type-I to meet the following specifications.
   i) Passband ripple ≤ 3 dB
   ii) Stopband attenuation ≥ 20 dB
   iii) Passband edge = 0.3 π rad/sample
   iv) Stopband edge = 0.6 π rad/sample.
   Use bilinear transformation technique and take T = 1 sec. **(14 Marks)**

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10EC53

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Analog Communication

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define Gaussian process and explain central Limit Theorem. **(06 Marks)**

b. State and explain three properties of auto correlation function. **(09 Marks)**

c. The random variable Y is the function of another random variable X in such way that Z = Cos (x) and X is uniformly distributed in the interval $(-\pi, \pi)$ ie.

$$f_x(x) = \frac{1}{2\pi} \text{ for } -\pi < x < \pi$$
$$= 0 \quad \text{otherwise}$$

Determine the expected value of z **(05 Marks)**

2 a. Represent an AM signal both in Time Domain and Frequency Domain giving their derivation and spectrums. **(08 Marks)**

b. Explain the AM Generation using switching modulator and give the spectrum representation of same. **(07 Marks)**

c. The Antenna current of an AM Transmitter is 6Amps when only carrier is sent but increased to 7Amps when the carrier is modulated by a single tone sinusoid. Find the percentage modulation. **(05 Marks)**

3 a. Explain coherent detection of a DSBSC wave with a Block Diagram. Also explain Quadrature null effect. **(07 Marks)**

b. Explain Quadrature carrier multiplexing with Block Diagram and Spectrums. **(07 Marks)**

c. Given $x(t) = \text{Cos}(2\pi f_c t)$ and $x(t) = \text{Sin } f_c(t)$. Find the Hilbert Transform $\hat{x}(t)$ in both the cases. **(06 Marks)**

4 a. Represent SSB both in Time Domain and Frequency Domain giving its spectrums. Also Give some advantages and disadvantages of SSB. **(08 Marks)**

b. Explain how to generate a VSB signal and give its frequency spectrum. **(05 Marks)**

c. Explain the process Frequency Translation in communication with a Block diagram. **(07 Marks)**

PART – B

5 a. Obtain the expression for single Tone sinusoidal FM wave and prove that FM has infinite number of side bands. **(09 Marks)**

b. Explain the Demodulation of FM wave by using Balanced frequency discriminator circuit and its frequency response. **(07 Marks)**

c. Calculate the maximum bandwidth requirements for FM broadcasting. Given maximum deviation allowed is 75KHz and maximum modulation frequency allowed is 10KHz. **(04 Marks)**

6 a. Explain PLL with a neat block diagram and derive the expression for the output. **(08 Marks)**

b. Explain a Linearised model of a PLL and obtain the expression for the output voltage. **(06 Marks)**

c. The equation for an FM wave is given by $s(t) = 10\text{Sin}\,[5.7 \times 10^{8}t + 5\ \text{Sin}\ 12 \times 10^{13}t]$. calculate :
(i) Carrier frequency (ii) Modulating frequency (iii) Modulation index
(iv) Frequency deviation (v) Power dissipated in 100Ω **(06 Marks)**

7 a. Explain the following :
(i) Thermal Noise (ii) Noise equivalent Band width (iii) Equivalent noise temperature. **(09 Marks)**

b. Obtain equivalent noise temperature of two networks in cascade as shown below :

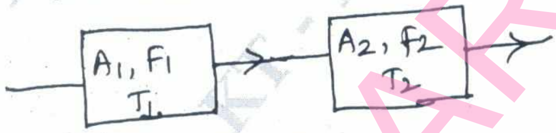

Fig Q7(b)

Where A_1, A_2 – are Gains ; $F_1 F_2$ – Noise Figures. T_1 T_2 – Temperature of two networks. **(06 Marks)**

c. A mixer of microwave receiver has noise Figure of 11 dB is preceded by a low noise amplifier having a power gain equal to 20dB and T_1 = 33°K. Calculate effective noise equivalent temperature of the combination. **(05 Marks)**

8 a. Calculate the figure of merit in the case of a SSB wave. **(07 Marks)**

b. Explain pre-emphasis and De-emphasis in FM. **(07 Marks)**

c. The average noise power per unit band width measured at the front end of AM receiver is |mw|Hz. The modulating wave is sinusoidal with a carrier power of 80k watts and side band power of 10k watts/side band. The message band width is 4KHz. Assuming the envelope detector in the receiver determine the output signal to noise ratio of the system. **(06 Marks)**

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10EC54

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Microwaves and Radar

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Derive the transmission line equation by considering the elementary section of transmission lines. **(12 Marks)**

b. A microwave generator at 1.2GHz supplies power to a microwave transmission line having following parameters R = 0.8Ω/m, G = 0.8m℧/m, L = 0.01μH/m, C = 0.4 PF/m. Find: i) γ ii) α iii) β iv) Z_o. **(08 Marks)**

2 a. Derive the equation for reflection coefficient and transmission coefficient. **(12 Marks)**

b. A line of $R_o = 400\Omega$ is connected to a load of 200 + j300Ω. Which is excited by a matched generator at 800MHz. Find the location and length of single stub nearest to the load to produce impedance match. Use switch chart. **(08 Marks)**

3 a. Explain TM mode of excitation of rectangular wave guide and derive the equation for the same. **(08 Marks)**

b. Explain the construction, working and applications of isolator based on faraday rotation. **(06 Marks)**

c. Indirect power to a directional coupler is 90W. The directional coupler has coupling factor of 20dB directivity of 35dB and insertion loss of 0.5dB. Find the output power at main arm, coupled and isolated ports. **(06 Marks)**

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

b. State and explain the properties of S-parameters. **(10 Marks)**

c. Explain the construction and working of PIN diode. Mention its advantages and application. **(04 Marks)**

PART – B

5 a. Explain with neat sketch a precision rotary phase shifter. **(08 Marks)**

b. What are losses encountered in microstrip line? Discuss briefly. **(08 Marks)**

c. Design a strip line transmission line for (w/b) ratio to be less than 0.5. The substrate thickness to be used is 0.32cm. Having a dielectric constant of 3.2. The characteristic impedance of the strip line so designed should be exactly 58Ω **(04 Marks)**

6 a. Derive the radar range equation. **(06 Marks)**

b. With the help of neat block diagram, explain the operation of radar system. **(08 Marks)**

c. A radar is expected to detect a target of cross sectional area of $10m^2$. The antenna used is a parabolic dish of diameter of 5 mtr. The radar operates at a wavelength of 10cm and transmits peak pulse power of 0.2Mw. Receiver can detect a minimum signal power of 10^{-13} watts. Find the maximum range at which target can be detected. **(06 Marks)**

7 a. With neat block diagram, explain the operation of MTI radar. (08 Marks)
b. Write brief note on: i) Delay line canceller ii) Blind speed. (06 Marks)
c. Determine the doppler frequency shift produced by an aeroplane moving with a speed of 800 KMPH and moving in trajectory inclined at an angle of 25° with the antenna axis. The CW radar operates at a wave length of 7.5cm. (06 Marks)

8 Write a short note on:
a. Parametric amplifier.
b. Shielded strip lines.
c. Precision type variable attenuator.
d. Bethe-hole coupler. (20 Marks)

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10EC55

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Information Theory and Coding

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Discuss the reasons for using logarithmic measure for measuring information. **(03 Marks)**

b. Derive an expression for the entropy of symbols in long independent sequence. find the entropy of a source in Nats/symbol of a source that emits one out of four symbols A, B, C and D in a statically independent sequence with probabilities $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$ and $\frac{1}{8}$. **(07 Marks)**

c. For the first order Markoff model as shown below Fig.Q1(c), find the state probabilities, entropy of each state, entropy of the source and show that $G_1 > H(s)$. **(10 Marks)**

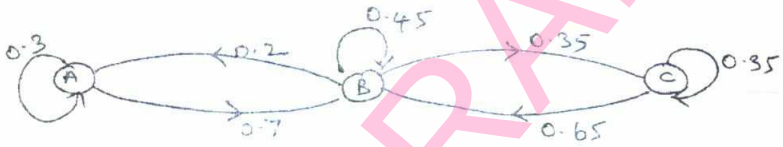

Fig.Q1(c)

2 a. A source emits an independent sequence of symbols from an alphabet consisting of five symbols A, B, C, D, E with probabilities $\frac{1}{4}, \frac{1}{8}, \frac{1}{8}, \frac{3}{16}$ and $\frac{5}{16}$ respectively. Find the binary code using Shannon's binary algorithm. Also find coding efficiency. **(10 Marks)**

b. For the channel matrix shown below for which $P(x_1) = \frac{1}{2}$, $P(x_2) = P(x_3) = \frac{1}{4}$ and $r_s = 10{,}000$/sec. Find H(x), H(y), H(y/x), H(x,y), I(x,y) and channel capacity.

$$P(y/x) = \begin{bmatrix} 0.8 & 0.2 & 0 \\ 0.1 & 0.8 & 0.1 \\ 0 & 0.2 & 0.8 \end{bmatrix}.$$ **(10 Marks)**

3 a. For the following source,

$S = \{s_1, s_2, s_3, s_4, s_5, s_6, s_7\}$ with probabilities

$P = \{\frac{1}{3}, \frac{1}{3}, \frac{1}{9}, \frac{1}{9}, \frac{1}{27}, \frac{1}{27}, \frac{1}{27}\}$

i) Find the compact Huffman code when $X = \{0, 1\}$ and $X = \{0, 1, 2\}$

ii) Find the coding efficiency for the above codes. **(10 Marks)**

b. Two noisy channels are cascaded whose channel matrices are given by

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

With $P(x_1) = P(x_2) = 0.5$, show that $I(x,y) > I(x, z)$. **(10 Marks)**

4 a. For the channel matrix shown below, find channel capacity and derive the expression for same.

$$P(b/a) = \begin{bmatrix} 0.4 & 0.3 & 0.2 & 0.1 \\ 0.4 & 0.1 & 0.3 & 0.2 \\ 0.1 & 0.2 & 0.4 & 0.3 \end{bmatrix}.$$ **(06 Marks)**

b. State and prove Shannon's Hartley law. Derive the expression for the upper limit of channel capacity. **(06 Marks)**

c. An analog signal has 4KHz bandwidth. The signal is sampled at 2.5 times the Nyquist rate and each sample is quantized to 256 equally likely levels. All samples are statistically independent.

i) What is information rate of the signal

ii) Can the output of this source be transmitted without errors over a Gaussian channel with a band width of 50KHz and S/N ratio of 23dB?

iii) What will be the bandwidth required for transmitting the o/p of the signal without errors, if S/N ratio is 10dB. **(08 Marks)**

PART – B

5 a. Prove that $G.H^T = 0$. **(04 Marks)**

b. The parity check bits of a (8, 4) linear block code is given by.

$C_5 = d_1 + d_2 + d_4$, $C_6 = d_1 + d_2 + d_3$,

$C_7 = d_1 + d_3 + d_4$, $C_8 = d_2 + d_3 + d_4$,

where d_1 d_2 d_3 and d_4 are databits.

i) Find generator and parity check matrix of this code

ii) Find all the code vectors

iii) Draw the encoding and syndrome calculation circuit. **(08 Marks)**

c. Design a linear block code with a minimum distance of three and message block size of eight bits. **(08 Marks)**

6 a. Given the generator polynomial of (7, 4) cyclic code $g(x) = 1 + x^2 + x^3$,

i) Find the code vector of messages 0101, 0111, 1010 and 1100 in systematic form

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

b. Consider a (15, 11) cyclic code generated by $g(x) = 1 + x^3 + x^4$. Derive a feedback shift register encoder circuit. Illustrate the encoding procedure with the message 11101000111 by listing the state of registers. **(08 Marks)**

7 Write a short note on:

a. Golay codes

b. Shortened cyclic code

c. Rs 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 endoder 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, Dec.2018/Jan.2019
Fundamentals of CMOS VLSI

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Obtain the transfer characteristics of a CMOS inverter and mark all the regions showing the status of PMOS and NMOS transistors. **(08 Marks)**

b. Using neat diagrams, describe fabrication steps of P-well CMOS process. **(08 Marks)**

c. Discuss the nMOS enhancement mode transistor for different conditions of Vds and Vgs. **(04 Marks)**

2 a. Discuss in detail the λ-based design rules for nMOS, and PMOS layers and transistors. **(10 Marks)**

b. Illustrate the schematic and stick diagram for the expression $Y = \overline{A(B+C)}$. **(10 Marks)**

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

b. Realize a 3-input NAND gate for clocked CMOS logic and also for CMOS domino logic. **(06 Marks)**

c. Discuss the working of pseudo nMOS logic with suitable example. **(04 Marks)**

4 a. What is sheet resistance? Derive the expression for sheet resistance. **(06 Marks)**

b. Derive the equation for rise and fall time for CMOS inverter. **(08 Marks)**

c. Write a note on limitations of scaling. **(06 Marks)**

PART – B

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

b. Explain structured design of bus arbitration logic for n-line bus. **(10 Marks)**

c. Explain: i) Dynamic register element ii) Dynamic shift register. **(06 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 4-bit serial-parallel multiplier. **(10 Marks)**

7 a. Explain with neat diagram the three transistor dynamic RAM cell. **(10 Marks)**

b. Explain nMOS pseudo-static memory cell using circuit and stick diagram. **(10 Marks)**

8 a. Narrate the meaning of "Real Estate" in VLSI design. **(05 Marks)**

b. Explain: i) Built-In-Self-Test (BIST) ii) Boundary Scan Test (BST). **(10 Marks)**

c. Write a short note on scan design techniques. **(05 Marks)**

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