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18ES51

Fifth Semester B.E. Degree Examination, June/July 2023
Technology Innovation Management and Entrepreneurship

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. List and explain four basic functions of management. **(10 Marks)**
b. List and explain managerial skills with the help of skill-mix diagram. **(10 Marks)**

OR

2 a. List and explain any five important characteristics of objectives in planning. **(10 Marks)**
b. Explain programmed and non-programmed decisions. **(10 Marks)**

Module-2

3 a. Explain the characteristics and typology of organizations. **(10 Marks)**
b. List and explain the sources of recruitment. **(10 Marks)**

OR

4 a. List and explain the requirements of effective direction. **(10 Marks)**
b. Explain five managerial styles using managerial grid chart. **(10 Marks)**

Module-3

5 a. Explain the social responsibilities of business towards employees and workers. **(10 Marks)**
b. Explain the corporate governance in India. **(10 Marks)**

OR

6 a. List and explain different types of entrepreneurs. **(10 Marks)**
b. Explain theory of achievement motivation and withdrawal of status respect models for entrepreneurial development. **(10 Marks)**

Module-4

7 a. List and explain the stages of development of a family business. **(10 Marks)**
b. List and explain the characteristics of a family-owned business in India. **(10 Marks)**

OR

8 a. Explain brainstorming and survey method to generate business ideas. **(10 Marks)**
b. List and explain what changes leads to the creation of opportunities. **(10 Marks)**

Module-5

9 a. Explain executive summary and management summary in business plans. **(10 Marks)**
b. Explain equity financing as a fund for project financing. **(10 Marks)**

OR

10 a. List and explain preliminary activities involved in selection of a project. **(10 Marks)**
b. Explain the need for network techniques. **(10 Marks)**

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18EC52

Fifth Semester B.E. Degree Examination, June/July 2023
Digital Signal Processing

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the frequency domain sampling of discrete time signals and obtain the DFT and IDFT expressions. **(10 Marks)**

b. Given that sequence x(n) = {2, 3, -1, -2}. Obtain the sequences i) $x((-n))_4$, ii) $x((n-2))_4$ and iii) $x((2-n))_4$. Represent the data points on a circle and show the circular shift. **(06 Marks)**

c. Given the sequence x(n) = {4, 3, 2, 1}, find y(n) if $y(k) = x((k-3))_4$. **(04 Marks)**

OR

2 a. Illustrate how the DFT and IDFT can be viewed as a linear transformation on sequences x(n) and x(k) respectively. **(06 Marks)**

b. Determine the 4-point circular convolution of the sequences.

$x_1(n) = \cos\left(\frac{2\pi n}{N}\right)$ and $x_2(n) = \sin\left(\frac{2\pi n}{N}\right)$; $0 \le n \le 3$ using the time domain formula. Verify the result using frequency domain approach using DFT and IDFT. **(08 Marks)**

c. Compute the 4-point DFT of the sequence x(n) = {1, 2, 3, 4}. Using time shift property find the DFT y(k), if $y(n) = x((n-3))_4$. **(06 Marks)**

Module-2

3 a. Write the computational methodology for overlap-save method of linear filtering. **(07 Marks)**

b. Compute the 8-point DFT of the sequence x(n) = {1, -1, 0, 0, 1, -1, 0, 0} using DIF-FFT algorithm. **(08 Marks)**

c. Find the number of complex multiplications and complex additions required to compute 1024 point DFT using.
i) Direct formula
ii) FFT algorithm
What is the speed improvement factor? **(05 Marks)**

OR

4 a. Develop radix-2 decimation in frequency FFT algorithm. **(07 Marks)**

b. Using overlap-add method, compute the output of an filter with impulse response h(n) = {1, -2, 3} and input x(n) = {1, 0, 2, 0, -1, -2, 3, -3, 1, 2} use 8-point circular convolution. **(08 Marks)**

c. Given x(k) = {0, j4, 0, -j4}, find x(n) using radix-2 DIT-FFT algorithm. **(05 Marks)**

Module-3

5 a. For a symmetric FIR filter of length 'M', show that the system function $H(z) = z^{-(M-1)} H(z^{-1})$. **(06 Marks)**

b. A low pass filter is to be designed with the desired frequency response.

$$H_d(w) = \begin{cases} e^{-j3w}, & |w| < \frac{3\pi}{4} \\ 0, & \frac{3\pi}{4} \le |w| \le \pi \end{cases}$$

Determine the filter coefficients h(n) if Hamming window is used. **(08 Marks)**

c. Realize the FIR filter for the following impulse responses:

i) $h(n)=\delta(n)+\frac{1}{4}\delta(n-1)-\frac{1}{8}\delta(n-2)-\frac{1}{8}\delta(n-3)+\frac{1}{4}\delta(n-4)+\delta(n-5)$.

ii) $h(n)=\left(\frac{1}{2}\right)^n[u(n)-u(n-4)]$. **(06 Marks)**

OR

6 a. Obtain the magnitude and phase response function of the rectangular window function

$$w(n)=\begin{cases}1, & n=0,1,\quad M-1\\ 0, & \text{otherwise}\end{cases}$$ **(06 Marks)**

b. Obtain the filter coefficients h(n) for a high pass filter with the following desired frequency response,

$$H_d(w)=\begin{cases}0, & |w|<\frac{\pi}{4}\\ e^{-j2w}, & \frac{\pi}{4}\le|w|\le\pi\end{cases}$$ use rectangular window function. **(08 Marks)**

c. Given the FIR filter with the difference equation $y(n) = x(n) + 2x(n-1) + 3x(n-2) + 2x(n-3)$. Obtain the lattice realization. **(06 Marks)**

Module-4

7 a. Obtain the mapping relation between s-plane and z-plane for the bilinear transformation. List the general mapping properties. **(08 Marks)**

b. Given an analog filter with transfer function $H(s)=\frac{5}{s+5}$ convert it into the digital filter transfer function and obtain the difference equation when a sampling period T = 0.05 sec. **(06 Marks)**

c. Realize the following digital filter using direct form-II $H(z)=\frac{0.5z^2+z+0.5}{z^2+0.5z+0.4}$. **(06 Marks)**

OR

8 a. List the analog low pass prototype transformations to different filter types and illustrate with the corresponding frequency responses. **(08 Marks)**

b. Design a digital low pass Butterworth filter with the following specifications. 3dB attenuation at the passband frequency 1.5kHz, 10dB stopband attenuation at the frequency 3kHz and sampling frequency of 8000Hz. Draw the direct form-II structure. **(12 Marks)**

Module-5

9 a. With a neat diagram, explain the Harvard architecture used in DS-processor. Draw the execution cycle. **(07 Marks)**

b. Illustrate the operation of circular buffers for four data samples and show the equivalent FIFO structure. **(07 Marks)**

c. Convert the following decimal numbers to the floating point numbers using 4 bit exponent and 12 bit mantissa. i) 0.64×2^{-2} ii) -0.64×2^{5}. **(06 Marks)**

OR

10 a. With a neat diagram, explain the basic architecture of TMS320C54× family DS processor. **(12 Marks)**

b. Perform the following:

i) Find the signed Q-15 representation of 0.16.

ii) Convert the Q-15 signed numbers to decimal

I. 0.100011110110010

II. 1.110101110000010 **(08 Marks)**

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18EC53

Fifth Semester B.E. Degree Examination, June/July 2023
Principles of Communication Systems

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the generation of AM wave using switching modulator. **(08 Marks)**

b. With neat block diagram, explain the working of Costas loop. **(06 Marks)**

c. Using the message signal $m(t) = \frac{t}{1+t^2}$, obtain the expression for AM wave when the percentage modulation are : i) 50% ii) 100% iii) 125%. **(06 Marks)**

OR

2 a. Explain the generation of DSBSC wave using ring modulator. **(08 Marks)**

b. Explain the concept of VSB transmission for analog and digital transmission. **(06 Marks)**

c. An audio frequency signal $m(t) = 5 \sin 2\pi (10^3)t$ in used to amplitude modulate a carrier of $c(t) = 100 \sin 2\pi (10^6)t$. If modulation index $\mu = 0.4$, find :
i) Side band frequencies
ii) Amplitude of each side band
iii) B.W.
iv) Efficiency of AM wave. Draw the frequency spectrum. **(06 Marks)**

Module-2

3 a. Explain the direct method of generating for waves. **(08 Marks)**

b. Write neat block diagram explain the operation of FM stereo system. **(08 Marks)**

c. A FM wave is given by
$S(t) = 10\cos [2\pi \times 10^6 + 0.2 \sin (2000\pi t)]$
Find out :
i) Carrier frequency
ii) Modulating frequency
iii) Power in the modulated signal
iv) B.W using Carson's rule. **(04 Marks)**

OR

4 a. With a neat diagram explain FM demodulation using balanced slope detector. **(07 Marks)**

b. What is angle modulation? Obtain the time domain expression for PM wave. **(07 Marks)**

c. A sinusoidal modulating wave form of amplitude 5V and a frequency of 1KHz is applied to an FM generator that has a frequency sensitivity constant of 40Hz/V. Find :
i) Frequency deviation ii) Modulation index. **(06 Marks)**

Module-3

5 a. Obtain the expression for Noise equivalent band width. **(07 Marks)**

b. Prove that FOM of AM receiver using envelope detector is $\frac{\mu^2}{2+\mu^2}$. **(07 Marks)**

c. Explain the use of pre-emphasis and de-emphasis in an FM system. **(06 Marks)**

OR

6 a. Prove that FOM as a DSBSC receiver in ONE. **(08 Marks)**

b. Define :
i) Shot Noise
ii) Thermal Noise
iii) White Noise. **(06 Marks)**

c. Write neat block diagram explain the FM threshold reduction. **(06 Marks)**

Module-4

7 a. What are the advantages of digital signal transmission over analog signal transmission? **(04 Marks)**

b. State and prove the sampling theorem for low pass signals. **(08 Marks)**

c. A signal $m(t) = 10\cos(20\pi t)\cos(200\pi t)$ is sampled at the rate of 250 samples/second.
i) Sketch the spectrum of sampled signal
ii) Specify the cut off frequency for the ideal reconstruction filter so as to recover m(t) from $m_f(t)$
iii) Specify the Nyquist rate for the signal m(t). **(08 Marks)**

OR

8 a. Explain the generation of PAM signals with neat block diagram. **(08 Marks)**

b. With neat block diagram, explain the generation of PPM signal. **(08 Marks)**

c. Write short notes on TDM with neat block diagram. **(04 Marks)**

Module-5

9 a. Prove that $(SNR)_{0dB} = 1.8 + 6n$ for an uniform quantizer. **(08 Marks)**

b. With neat block diagram, explain the construction and regeneration of PCM signal. **(08 Marks)**

c. Write a short note on VOCODER. **(04 Marks)**

OR

10 a. Explain the construction of Delta modulation signal and explain its disadvantages. **(08 Marks)**

b. Explain how digitization of video and MPEG is achieved with relevant diagram. **(07 Marks)**

c. To transmit a bit sequence 10011011. Draw the resulting wave form using :
i) Unipolar signaling.
ii) Polar signaling.
iii) Rectangular RZ type.
iv) Bipolar RZ.
v) Manchester. **(05 Marks)**

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18EC54

Fifth Semester B.E. Degree Examination, June/July 2023
Information Theory and Coding

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. A DMS emits symbols from the source alphabet S = {S_1, S_2, S_3, S_4, S_5, S_6, S_7} with P = {0.25, 0.25, 0.125, 0.125, 0.125, 0.0625, 0.0625}. Compute :
i) H(s) ii) $H(s)_{max}$ iii) Information
Rate R if r_s = 5 symbols/sec. **(06 Marks)**

b. The state diagram of the Markov source is shown below Q1(b)

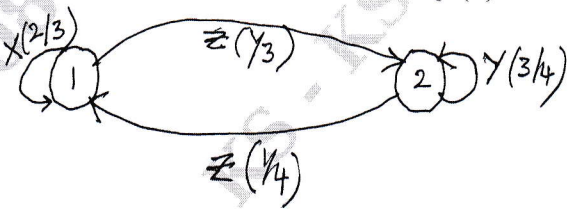

Fig Q1(b)

i) Find the Entropy of the source
ii) Find the Message Entropy G_1, G_2
iii) Verify $G_1 \geq G_2 \geq H(s)$ **(10 Marks)**

c. A zero memory has a source alphabet S = {S_1, S_2, S_3} with P = $\left\{\frac{1}{2}, \frac{1}{4}, \frac{1}{4}\right\}$. Construct the second order source and compute its entropy. **(04 Marks)**

OR

2 a. Prove that the Entropy is maximum when the symbols are equiprobable. **(06 Marks)**

b. Design a system to report heading of collection of 400 cars. The heading levels heading straight, turning left and turning right. The information is transmitted every second.
i) On an average during a reporting interval 200 cars were heading straight, 100 were turning left and remaining were turning right.
ii) Out of 200 cars that reported heading straight, 100 were going straight during next reporting interval, 50 turning left and remaining were turning right in the next reporting interval.
iii) Out of 100 cars reported turning during signaling period, 50 continued turning and the remaining headed straight during the next reporting interval.
iv) The dynamics of the car did not allow them to turn left to right and vice versa
Find entropy of the state and source. Also, find Rate of informations. **(10 Marks)**

c. Prove that entropy of the second order Binary source is $S^2 = 2H(s)$ bits/sy m **(04 Marks)**

Module-2

3 a. Construct a Shannon Fano code for the following symbols :
S = {S_1, S_2, S_3, S_4, S_5, S_6}
P = {0.2, 0.4, 0.15, 0.15, 0.06, 0.04} **(10 Marks)**
With code alphabet X = {0, 1} and X = {0, 1, 2}. Find the efficiency of the code.

b. A discrete memory less source has an alphabet of six symbols with probability statistics as given below :

Symbols	:	A	B	C	D	E	F
P	:	0.3	0.25	0.20	0.12	0.08	0.05

i) Construct the Huffman code by moving combined symbols as high as possible. Compute efficiency and variance

ii) Construct the Huffman trainary code by moving symbols combined as high as possible.

(10 Marks)

OR

4 a. Test whether the following code is a prefix code :

A	1			
B	0	1		
C	0	0	1	
D	0	0	0	1

(04 Marks)

b. Encode the symbols using Shannon encoding algorithm and compute the coding efficiency and variance for the following symbol set :

$X = \{x_1, x_2, x_3, x_4, x_5\}$

$P = \left\{\frac{5}{16}, \frac{1}{4}, \frac{3}{16}, \frac{1}{8}, \frac{1}{8}\right\}$ **(10 Marks)**

c. A DMS has an alphabet

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

$P = \left\{\frac{1}{12}, \frac{1}{8}, \frac{1}{12}, \frac{1}{8}, \frac{1}{3}, \frac{1}{4}\right\}$

Construct Huffman code for the code alphabet $X = \{0, 1, 2\}$. Compute coding efficiency.

(06 Marks)

Module-3

5 a. Compute Entropy function H(x), H(y) H(xy), H(x/y), H(y/x), Data transmission rate and channel capacity, given $\tau = 0.1$ sec/sym and $P(xy) = \begin{bmatrix} 0.15 & 0 & 0 & 0.15 \\ 0 & 0.2 & 0.15 & 0 \\ 0 & 0 & 0.1 & 0.05 \\ 0.1 & 0.1 & 0 & 0 \end{bmatrix}$ **(07 Marks)**

b. Compute the channel capacity for the channel given below :

$P(y/x) = \begin{bmatrix} 0.6 & 0.2 & 0.2 \\ 0.2 & 0.6 & 0.2 \\ 0.2 & 0.2 & 0.6 \end{bmatrix}$. Given $r_s = 1000$ sym/sec. **(05 Marks)**

c. Derive an expression for the channel capacity of a Binary Erasure channel. **(08 Marks)**

OR

6 a. Prove that Mutual information is always positive. **(06 Marks)**

b. Compute the channel capacity for the channel with $r_s = 1000$sym/sec and

$P(y/x) = \begin{bmatrix} 0.6 & 0.4 \\ 0.7 & 0.3 \end{bmatrix}$ **(06 Marks)**

c. A Binary channel has the following characteristics :

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

Compute :

i) Mutual information

ii) Channel capacity if $r_s = 100$ sym/sec. **(08 Marks)**

Module-4

7 a. For a (6, 3) Linear Block code, the check bits are related to the message bits as per the equations given below :

$C_4 = d_1 + d_2$; $C_5 = d_1 + d_2 + d_3$; $C_6 = d_2 + d_3$

i) Obtain the Generator Matrix G.

ii) Find all possible code words.

iii) Find H and H^T.

iv) Computer syndrome if there is an error in the 3rd bit of a transmitted codeword [110 001] and show how it can be corrected. **(10 Marks)**

b. For a (6, 3) cyclic code find the following :

i) g(x) ii) G in systematic form iii) find all possible code words. **(06 Marks)**

c. For a (7, 3) Hamming code with $g(x) = 1 + x + x^2 + x^4$, design a suitable encoder to generate systematic cyclic codes. **(04 Marks)**

OR

8 a. Prove that C. $H^T = 0$ there by show that $S = E. H^T$ **(06 Marks)**

b. A (7, 4) cyclic code has the generator polynomial $g(x) = 1 + x + x^4$. Design a syndrome computation circuit and verify the circuit for the message polynomial $d(x) = 1 + x^3$. **(07 Marks)**

c. For a (7, 4) 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 G and H matrix

ii) Draw the Encoder and syndrome computation circuit. **(07 Marks)**

Module-5

9 a. Consider (3, 1, 2) convolutional encoder with g(1) = (110), g(2) = (101), g(3) = (111)

i) Write the Encoder circuit.

ii) Write the state transition table.

iii) Write the state diagram.

iv) Write the code tree. **(10 Marks)**

b. For a (2, 1, 3) convolutional encoder with $g^1 = (1101)$, $g^2 = (1011)$

i) Find the constraint length.

ii) Find the rate efficiency.

iii) Find the codeword for the message sequence (11101) using matrix and frequency domain approach. **(10 Marks)**

OR

10 a. Explain Viterbi Decoding algorithm with an example. **(08 Marks)**

b. For the State show below with $S_0 = 00$, $S_1 = 10$, $S_2 = 01$, $S_3 = 11$, draw the trellis diagram. For the input sequence m = {1 0 1} trace the output.

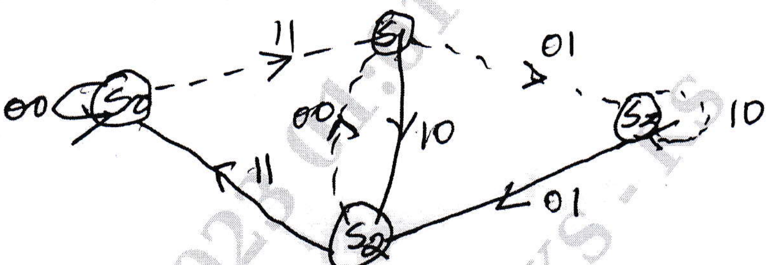

Fig Q10(b) **(06 Marks)**

c. Define the following distance properties of convolution codes
   i) Minimum free distance
   ii) Column distance function
   iii) Minimum distance **(06 Marks)**

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18EC55

Fifth Semester B.E. Degree Examination, June/July 2023
Electromagnetic Waves

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Derive the expression for Electric Field due to line charge of infinite length. **(08 Marks)**

b. Find the force on 100 μc charge at (0, 0, 3)m , if four like charges of 20 μc are located on the x and y axis at ±4m. **(06 Marks)**

c. Determine Electric Field at origin due to charge at 6.44×10^{-9}C located at (4, 2, –3)m in Cartesian coordinate system. **(06 Marks)**

OR

2 a. A charge lies in the Z = –3m plane in the form of a square sheet defined by $-2 \le x \le 2$, $-2 \le y \le 2$ m with $\rho_s = 2(x^2 + y^2 + 9)^{3/2}$ nc. Find Electric field at origin. **(07 Marks)**

b. Three negative charges $Q_1 = -1$ μC , $Q_2 = -2$ μC , $Q_3 = -3$ μC are placed at the corners of an equilateral triangle. If length of each side is 1m, find magnitude and direction of EF at a point bisecting line between the charge Q_2 and Q_3. **(08 Marks)**

c. Derive the expression for Electric field intensity due to several point charges. **(05 Marks)**

Module-2

3 a. A charge Q is uniformly distributed in a square ring of side *l*. Find E and V at centre of the ring. **(08 Marks)**

b. Determine work done in carrying a charge of – 2C from (2, 1, –1) to (8, 2, –1) in Electric field $E = y\hat{a}_x + x\hat{a}_y$ considering the path along parabola $x = 2y^2$. **(05 Marks)**

c. State and prove Gauss divergence theorem. **(07 Marks)**

OR

4 a. A point charge Q = 90 μC is located at origin and these are two uniformly surface charge density distribution – 8 μC/m^2 at r = 1m and 4.5 μC/m^2 at r = 2. Find $\overline{D}$ everywhere. **(08 Marks)**

b. Given $D = 5r\ \hat{a}_r$ C/m^2. Determine whether divergence theorem holds good for shell region enclosed by spherical surface at r = a and r = b(b > a) centred at origin. **(07 Marks)**

c. Find the potential and volume charge density at P(0.5, 1.5, 1)m in free space given $V = 2x^2 - y^2 - z^2$. **(05 Marks)**

Module-3

5 a. Let $V = A \ln\left[\frac{B(1-\cos\theta)}{1+\cos\theta}\right]$

i) Show that V satisfies Laplace equation in spherical coordinates.

ii) Find A and B, so that V = 100 V and E = 500 at r = 5cm, θ = 90, ϕ = 60°. **(08 Marks)**

b. State and explain strokes theorem. **(04 Marks)**

c. Determine whether or not the following potential satisfy Laplace equation :

i) $V = r\cos\phi + z$ ii) $V = x^2 - y^2 + z^2$ **(08 Marks)**

OR

6 a. Find the magnetic field intensity at P for the Fig.Q6(a).

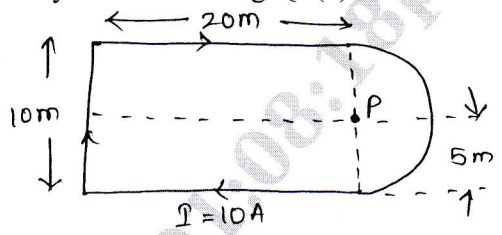

Fig.Q6(a) **(08 Marks)**

b. There exist a potential of V = –2.5V on the conductor of 0.02m and V = 15V at r = 0.35m. Determine E and D by solving Laplace equation in spherical coordinates. **(07 Marks)**

c. If the magnetic field intensity in region $H = (3y - 2)\,\hat{a}_z + 2x\,\hat{a}_y$. Find current density. **(05 Marks)**

Module-4

7 a. For region1, $\mu_1 = 4\mu$ H/m and for region2, $\mu_2 = 6\mu$ H/m. The regions are separated by Z = 0 plane. The surface current density at the boundary is $K = 100\,\hat{a}_x$ A/m. Find B_2 if $B_1 = 2\,\hat{a}_x - 3\,\hat{a}_y + \hat{a}_z$ mT for Z = 0. **(08 Marks)**

b. A circular conducting loop of radius 40cm lies in xy plane and has a resistance of 20Ω. If magnetic flux density is $B = 0.2\cos(500t)\,\hat{a}_x + 0.75\sin(400t)\,\hat{a}_y + 1.2\cos(314t)\,\hat{a}_z$. Find induced current in Loop. **(07 Marks)**

c. Explain Lorentz force equation. **(05 Marks)**

OR

8 a. A conductor of length 2.5m in Z = 0 and x = 4m carries a current of 12A in $-\hat{a}_y$ direction. Calculate uniform flux density in region, if force on the conductor is 12×10^{-2} N in direction by $\left[\frac{-\hat{a}_x + \hat{a}_z}{\sqrt{2}}\right]$ **(07 Marks)**

b. Explain Magnetization and Permeability. **(07 Marks)**

c. Explain force between differential current elements with equation. **(06 Marks)**

Module-5

9 a. Given $H = H_m e^{j(wt + \beta z)}\,\hat{a}_x$ A/m in free space. Find E. **(07 Marks)**

b. Derive the wave equation for vector E and H field in conducting medium. **(08 Marks)**

c. Prove that $\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$. **(05 Marks)**

OR

10 a. Discuss the propagation of uniform plane wave in good conductor and explain skin depth. **(08 Marks)**

b. Determine $\alpha, \beta, \gamma, v, \lambda, \eta$ for damp soil at frequency of 1 MHz given that $\varepsilon_r = 12$, $\mu_r = 1$, and $\sigma = 20$m ʊ/m. **(05 Marks)**

c. Find the Amplitude of displacement current density in free space within large power distribution

$H = 10^6 \cos(377t + 1.256\times10^{-6}z)\,\hat{a}_y$ **(07 Marks)**

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18EC56

Fifth Semester B.E. Degree Examination, June/July 2023
Verilog HDL

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain typical design flow for designing VLSI IC circuits with a neat flow chart. **(10 Marks)**

b. Explain top-down design methodology and bottom-up design methodology. **(06 Marks)**

c. Explain trends in HDL's. **(04 Marks)**

OR

2 a. Explain design hierarchy by taking 4-bit ripple carry counter. **(08 Marks)**

b. Define the following terms with examples "
i) Module
ii) Instances
iii) Instance name. **(06 Marks)**

c. Explain the different levels of abstraction used for programming in verilog. **(06 Marks)**

Module-2

3 a. With a neat block diagram, explain the components of verilog module. **(08 Marks)**

b. Explain $display, $monitor, $finish and $stop system tasks with examples. **(08 Marks)**

c. How to write comments in verilog HDL, explain with examples. **(04 Marks)**

OR

4 a. Explain the following data types of with an examples :
i) Nets
ii) Registers
iii) Integers
iv) Parameters. **(08 Marks)**

b. Write verilog description of SR latch. Also write stimulus code. **(08 Marks)**

c. With an example, explain hierarchical names. **(04 Marks)**

Module-3

5 a. What are Rise, Fall and Turn-off delays? How they are specified in verilog. **(06 Marks)**

b. Write a verilog dataflow level of abstraction for 4 to 1 multiplexer using conditional operator. Also write stimulus code. **(08 Marks)**

c. Design a gate level module according to the logic diagram given Fig.Q5(c). Write stimulus code delay.

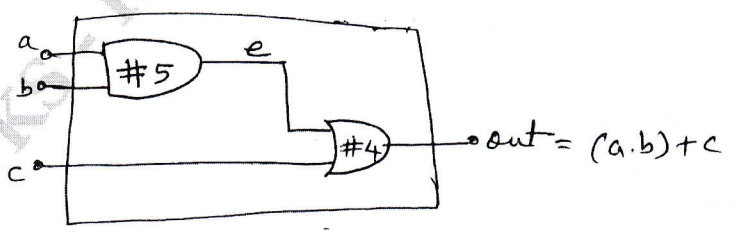

Fig.Q5(c) **(06 Marks)**

OR

6 a. Develop a gate-level verilog code for 4-bit ripple carry adder from 1-bit full adder. What is the output if A = 1010, B = 1100 and $c_{in} = 0$ at t = 0. **(10 Marks)**

b. What would be the output of the following :
a = 4'b0111, b = 4'b1001
i) &b
ii) a<<2
iii) {a, b}
iv) {2{b}}
v) a ^ b
vi) a|b
vii) a & b
viii) ~ a. **(08 Marks)**

c. Declare following variables in Verilog,
i) A 8-bit vector called a – in
ii) An integer called count. **(02 Marks)**

Module-4

7 a. Discuss sequential and parallel blocks with examples. **(08 Marks)**

b. Write a verilog behavionral description of 8 : 1 multiplexer using case statement. **(06 Marks)**

c. Illustrate the use while loop and repeat loop with examples. **(06 Marks)**

OR

8 a. Explain blocking and non-blocking assignment statements with relevant examples. **(08 Marks)**

b. Write verilog behavioral description of 4-bit binary counter. **(06 Marks)**

c. Write the verilog behavioral description of Dflip – flap. **(06 Marks)**

Module-5

9 a. Define the term logic synthesis. With a neat flow-chart explain computer – Aided logic synthesis process. **(10 Marks)**

b. What will the following statement translate to when run on a logic synthesis tool,
i) assign y = (a&b) | (c&b) where y, a, b, c and d are 3 – bit vectors

ii)
```
if(s)
  out = i1 ;
else
  out = i0 ;
```
(10 Marks)

OR

10 a. With neat flow diagram explain synthesis design flow. **(10 Marks)**

b. Write a notes on :
i) Assign and deassign
ii) Overriding parameters. **(10 Marks)**

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