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18ES51

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
Technological 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. Define Management. Explain any four Management functions. (10 Marks)
b. Explain roles of a Manager. (10 Marks)

OR

2 a. Define Planning. Explain any four limitations of Planning. (10 Marks)
b. Explain types of Decision making. (10 Marks)

Module-2

3 a. Define Organisation. Explain the principles of Organizing. (10 Marks)
b. Define Recruitment. Explain the steps involved in Selection process. (10 Marks)

OR

4 a. Explain Maslow's need hierarchy theory and Herzberg's two factor theory as applicable to an Organization. (10 Marks)
b. Discuss any five purpose of Communication in an Organization. (10 Marks)

Module-3

5 a. Describe Social responsibility of Business towards different groups. (10 Marks)
b. What is Social Audit? What are its benefits and limitations? (10 Marks)

OR

6 a. Define Entrepreneurship. Discuss the characteristics of a Successful Entrepreneurs. (10 Marks)
b. Illustrate Entrepreneurial development cycle. (10 Marks)

Module-4

7 a. Explain in brief, the characteristics of Family owned business in India. (10 Marks)
b. Describe '3 Circle' model of Family business. (07 Marks)
c. List out various types of Family business. (03 Marks)

OR

8 a. Discuss various methods of generating Business ideas. (08 Marks)
b. Explain Market Entry Strategies. (10 Marks)
c. What is Ecological Feasibility? (02 Marks)

Module-5

9 a. Define Business Plan. Discuss the reasons for preparing a Business Plan. (10 Marks)
b. Explain any four Government schemes for funding Business. (10 Marks)

OR

10 a. Illusptrate the network design and discuss the importance of Network Analysis. (10 Marks)
b. Discuss the steps in PERT Network. (04 Marks)
c. Compare PERT and CPM Network Techniques. (06 Marks)

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18EC52

Fifth Semester B.E. Degree Examination, Feb./Mar.2022
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. Prove that the sampling of DTFT of a sequence x(n) result in N-point DFT with a neat diagram. **(10 Marks)**

b. Find the 4-point DFT of the sequence $x(n) = \{1, 0, 0, 1\}$ using matrix method and verify the answer by taking the 4-point IDFT of the result. **(10 Marks)**

OR

2 a. Derive the circular Time shift property. **(06 Marks)**

b. Compute the circular convolution of the following sequences using DFT and IDFT method $x_1(n) = \{1, 2, 3, 4\}$ and $x_2(n) = \{4, 3, 2, 1\}$. **(09 Marks)**

c. If $W(n) = \frac{1}{2} + \frac{1}{2}\cos\left[\frac{2\pi}{N}\left(n - \frac{N}{2}\right)\right]$, what is the DFT of the window sequence $y(n) = x(n).w(n)$? Relate the answer in terms of X(K). **(05 Marks)**

Module-2

3 a. Find the output y(n) of a filter whose impulse response is h(n) = {1, 1, 1} and the input signal $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 1\}$ using overlap-add method. Assume the length of each block N is 6. **(10 Marks)**

b. What do you mean by computational complexity? Compare the direct computation and FFT algorithms. In the direct computation of 32-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)**

OR

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

b. Given $x(n) = n + 1$ for $0 \le n \le 7$. Find X(K) using DIF-FFT algorithm. **(10 Marks)**

Module-3

5 a. What are the different design techniques available for the FIR filters? Explain Gibbs phenomenon. Explain the four window techniques for the designing of FIR filters. **(10 Marks)**

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

$$H_d(e^{j\omega}) = \begin{cases} e^{-j3\omega} & , \text{for } -\frac{3\pi}{4} \le \omega \le \frac{3\pi}{4} \\ 0 & , \frac{3\pi}{4} \le \omega \le \pi \end{cases}$$

Determine $H(e^{j\omega})$ for M = 7 using Hamming window. **(10 Marks)**

OR

6 a. A FIR filter is given by,

$$y(n) = x(n) + \frac{2}{5}x(n-1) + \frac{3}{4}x(n-2) + \frac{1}{3}x(n-3)$$

Draw the lattice structure. **(10 Marks)**

b. Based on the frequency-sampling method, determine the coefficients of a linear-phase FIR filter of length M = 15 which has a symmetric unit sample response and a frequency response that satisfies the conditions.

$$H\left(\frac{2\pi}{15}K\right) = 1; \quad K = 0,1,2,3$$
$$= 0.4; \quad K = 4$$
$$= 0 \quad ; \quad K = 5,6,7$$

(10 Marks)

Module-4

7 a. The normalized transfer function of a 2nd order Butterworth filter is given by,

$$H_2(S) = \frac{1}{S^2 + 1.414S + 1}$$

Convert the analog filter into digital filter with cut-off frequency of 0.5π rad/sec using bilinear transformation. Assume T = 1 sec. **(10 Marks)**

b. A filter is given by the difference equation $y(n) - \frac{1}{4}y(n-1) + \frac{1}{8}y(n-2) = x(n) + \frac{1}{2}x(n-2)$.

Draw direct form – I and direct form – II realizations. Also obtain the transfer function of the filter. **(10 Marks)**

OR

8 a. Derive mapping function used in transforming analog filter to digital filter by bilinear transformation, preserves the frequency selectivity and stability properties of analog filter. **(10 Marks)**

b. Design an IIR digital Butterworth filter that when used in the analog to digital with digital to analog will satisfy the following equivalent specification.

(i) Low pass filter with −1 dB cut off 100 π rad/sec.
(ii) Stop band attenuation of 35 dB at 1000 π rad/sec.
(iii) Monotonic in stop band and pass band.
(iv) Sampling rate of 2000 rad/sec.
(v) Use bilinear transformation. **(10 Marks)**

Module-5

9 a. With the block diagram, explain Digital Signal processors based on the Harvard architecture. **(10 Marks)**

b. Discuss briefly the following special digital signal processor hardware units:

(i) Multiplier and Accumulator (MAC) unit.
(ii) Shifters.
(iii) Address Generators. **(10 Marks)**

OR

10 a. Discuss the following IEE Floating-point formats:

(i) Single precision format.
(ii) Double precision format. **(10 Marks)**

b. With the diagram, explain the basic architecture of TMS320C54X family processor. **(10 Marks)**

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18EC53

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
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. Write an AM wave expression in time domain and in frequency domain. Draw AM waveform. **(07 Marks)**

b. With neat diagram, explain the demodulation of AM wave using envelope detector. **(08 Marks)**

c. An audio frequency signal $M(t) = 5 \sin 2\pi (10^3)t$ is used to amplitude modulate a carrier of $C(t) = 100 \sin 2\pi (10^6)t$. Assume modulation index $\mu = 0.4$. Find: i) Sideband frequencies ii) Amplitude of each sideband iii) Bandwidth iv) Total power delivered to a load of 100μ v) Find efficiency of AM wave, assume R = 1Ω. **(05 Marks)**

OR

2 a. Explain the generation of DSBSC wave using a Ring modulator. **(10 Marks)**

b. Explain with a neat diagram, the working of Quadrature Carrier Multiplexing (QAM). **(08 Marks)**

c. An AM signal with a carrier of 1kW has 200W in each sideband. What is the percentage of modulation? **(02 Marks)**

Module-2

3 a. Define angle modulation. Derive the FM wave expression in time domain. **(08 Marks)**

b. Define the following terms:
i) Modulation index
ii) Frequency deviation
iii) Bandwidth **(07 Marks)**

c. A FM wave is represented by the equation $V = 10 \sin [5 \times 10^8 t + 4 \sin 1250t]$. Find: i) Carrier frequency and modulating frequency ii) Modulation index and frequency deviation iii) Bandwidth using Carson's rule. **(05 Marks)**

OR

4 a. Write the basic block diagram of PLL. Derive the expression for non-linear model of PLL. **(10 Marks)**

b. Explain the direct method of generating FM wave using Hartley oscillator with relevant equations and diagram. **(06 Marks)**

c. Write the Narrowband FM and wideband FM expression. **(04 Marks)**

Module-3

5 a. Derive the expression for figure of merit of an AM receivers using envelope detection. **(10 Marks)**

b. Explain the noisy receiver model with neat diagram. Explain briefly the figure of merit. **(06 Marks)**

c. Explain the noise equivalent bandwidth with relevant equation. **(04 Marks)**

OR

6 a. Derive the expression for Figure Of Merit (FOM) for DSBSC receiver. **(10 Marks)**

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

c. Define the white noise. Briefly explain the power spectral density and autocorrelation function of white noise. **(04 Marks)**

Module-4

7 a. State sampling theorem. Write the mathematical form of sampled signal and explain the steps to reconstruct the signal g(t) from the sequence of sample value. **(10 Marks)**

b. Explain the concept of TDM with a neat block diagram. **(06 Marks)**

c. What is aperture effect? Briefly explain how to overcome this effect. **(04 Marks)**

OR

8 a. Briefly explain the following pulse modulation with waveform:
i) PAM ii) PWM iii) PPM. **(09 Marks)**

b. With neat block diagram, explain the generation of PPM wave. **(05 Marks)**

c. Explain the following terms:
i) Under sampling
ii) Over sampling
iii) Nyquist rate. **(06 Marks)**

Module-5

9 a. Derive the expression of output signal to noise ratio of a uniform quantizer. **(08 Marks)**

b. With neat block diagram, explain the transmitter, transmission path and receiver of a PCM system. **(08 Marks)**

c. An audio signal digitalized using PCM. Assume the audio signal bandwidth to be 20kHz.
i) What is the Nyquist rate and Nyquist period of the audio signal?
ii) If the samples are quantized to L = 4096 levels and then binary coded, determine the number of bits required to encode a sample. **(04 Marks)**

OR

10 a. Draw the line codes for given binary representation 01101001
i) Unipolar NRZ signaling
ii) Polar NRZ signaling
iii) Unipolar RZ signaling
iv) Bipolar RZ signaling
v) Manchester code. **(10 Marks)**

b. Explain granular noise and slope overload distortion in delta modulation. **(04 Marks)**

c. With neat diagram explain delta modulation system. **(06 Marks)**

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18EC54

Fifth Semester B.E. Degree Examination, Feb./Mar.2022
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. Define self information. Why logarithmic expression is chosen for measuring information. **(04 Marks)**

b. (i) Find relationship between Hartleys, nats and bits.

(ii) A discrete source emits one of the four symbols S_0, S_1, S_2 and S_3 with probabilities 1/3, 1/6, 1/4 and 1/4 respectively. The successive symbols emitted by the source are statistically independent. Calculate the entropy of the source. **(08 Marks)**

c. (i) State the properties of entropy.

(ii) A source transmits two independent messages with probabilities of P and 1−P respectively. Prove that the entropy is maximum when both the message are equally likely. Plot the variation of entropy (H) as a function of probability 'P' of the messages. **(08 Marks)**

OR

2 a. Consider the following Markov source shown in Fig. Q2 (a). Find the

(i) State probabilities (ii) State entropies.

(iii) Source entropy. (iv) G_1, G_2

(v) Show that $G_1 > G_2 > H$ **(10 Marks)**

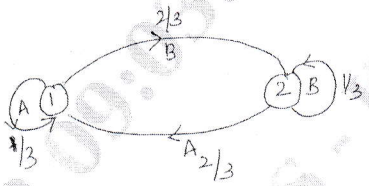

Fig. Q2 (a)

b. Consider a zero memory source emitting three symbols x, y and z with respective probabilities {0.6, 0.3, 0.1}. Calculate

(i) Entropy of the source.

(ii) All symbols and the corresponding probabilities of the second order extension of the source. Find the entropy of the second-order extension of the source.

(iii) Show that $H(s^2) = 2 * H(s)$ **(10 Marks)**

Module-2

3 a. The table 3.1 below provides codes for five different symbols. Identify which of the following codes are prefix codes. Also draw the decision diagram for the prefix codes. **(04 Marks)**

Code A	Code B	Code C	Code D
0	1	00	10
10	01	110	111
110	111	1110	110
1110	10	001	01
111	00	011	00

b. Apply Shannon's encoding algorithm to the following set of messages and obtain code efficiency and redundancy. **(10 Marks)**

m_1	m_2	m_3	m_4	m_5
$\frac{1}{8}$	$\frac{1}{16}$	$\frac{3}{16}$	$\frac{1}{4}$	$\frac{3}{8}$

c. Construct a Binary code by applying Huffman encoding procedure for the following messages with respective probabilities of 0.4, 0.2, 0.2, 0.1, 0.07 and 0.03. Also determine the code efficiency and redundancy of the code. **(06 Marks)**

OR

4 a. Design a Trinary source code for the source shown using Huffman's coding procedure:

$S = \{S_1\ S_2\ S_3\ S_4\ S_5\ S_6\}$

$P = \left\{\frac{1}{3}, \frac{1}{4}, \frac{1}{8}, \frac{1}{8}, \frac{1}{12}, \frac{1}{12}\right\}$. **(10 Marks)**

b. Consider a source $S = \{S_1, S_2\}$ with probabilities $\frac{3}{4}$ and $\frac{1}{4}$ respectively. Obtain Shannon-Fano code for source S, its 2nd and 3rd extension. Calculate efficiencies for each case and justify the results. **(10 Marks)**

Module-3

5 a. What is mutual information? Mention its properties. **(06 Marks)**

b. A transmitter has an alphabet consisting of 5 letters $\{a_1, a_2, a_3, a_4, a_5\}$ and the receiver has an alphabet of four letters $\{b_1, b_2, b_3, b_4\}$. The joint probabilities of the system are given below:

$$P(A, B) = \begin{array}{c} \\ a_1 \\ a_2 \\ a_3 \\ a_4 \\ a_5 \end{array} \begin{array}{c} \begin{array}{cccc} b_1 & b_2 & b_3 & b_4 \end{array} \\ \begin{pmatrix} 0.25 & 0 & 0 & 0 \\ 0.10 & 0.30 & 0 & 0 \\ 0 & 0.05 & 0.10 & 0 \\ 0 & 0 & 0.05 & 0.1 \\ 0 & 0 & 0.05 & 0 \end{pmatrix} \end{array}$$

Compute different entropies of the channel. **(08 Marks)**

c. For the channel matrix shown, find the channel capacity.

$$P\left(\frac{b_j}{a_i}\right) = \begin{array}{c} \\ a_1 \\ a_2 \\ a_3 \end{array} \begin{array}{c} \begin{array}{ccc} b_1 & b_2 & b_3 \end{array} \\ \begin{pmatrix} \frac{1}{2} & \frac{1}{3} & \frac{1}{6} \\ \frac{1}{3} & \frac{1}{6} & \frac{1}{2} \\ \frac{1}{6} & \frac{1}{2} & \frac{1}{3} \end{pmatrix} \end{array}$$

(06 Marks)

OR

6 a. In a communication system a transmitter has 3 input symbols $A = \{a_1, a_2, a_3\}$ and receiver also has 3 output symbols $B = \{b_1, b_2, b_3\}$. The matrix given below shows joint probability matrix with some marginal probabilities. **(06 Marks)**

a_i \ b_j	b_1	b_2	b_3
a_1	$\frac{1}{12}$	*	$\frac{5}{36}$
a_2	$\frac{5}{36}$	$\frac{1}{9}$	$\frac{5}{36}$
a_3	*	$\frac{1}{6}$	*
$P(b_j)$	$\frac{1}{3}$	$\frac{14}{36}$	*

(i) Find the missing probabilities (*) in the table.

(ii) Find $P(b_3/a_1)$ and $P(a_1/b_3)$

(iii) Are the events a_1 and b_1 statistically independent? Why?

b. Find the capacity of the channel shown in the Fig. Q6 (b) below using Murugo's method. **(08 Marks)**

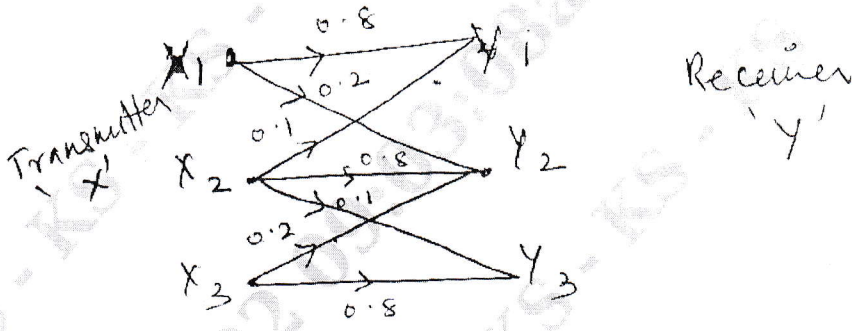

Fig. Q6 (b)

c. Discuss Binary Ensure channel and derive channel capacity equation. **(06 Marks)**

Module-4

7 a. 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 code vectors.

(ii) Draw the encoding circuit.

(iii) Draw the syndrome calculation circuit. **(10 Marks)**

b. Design an encoder for a (7, 4) binary cyclic code generated by $g(x) = 1 + x + x^3$ and verify its operation using the message vectors (1 0 0 1) and (1 0 1 1). **(10 Marks)**

OR

8 a. Define G and H matrix and show that $GH^T = 0$. **(05 Marks)**

b. The Parity check bits of a (8, 4) block code are generated 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, d_4 are the message bits.

(i) Find the generator and parity matrix for this code.

(ii) Find the minimum weight.

(iii) Show that its capable of correcting all single error pattern and capable of detecting double errors by preparing the syndrome table for them. **(10 Marks)**

c. Design a linear block code with minimum distance $d_{min} = 3$ and message length of 4 bits. **(05 Marks)**

Module-5

9 a. With a neat block diagram, draw a general decoding circuit for a linear block code. Also draw the complete error correcting circuit for a (7, 4) linear block code if the error bits are given in terms of the syndrome bits as given in equation below:

$S = [S_1\ S_2\ S_3] = [(r_1 + r_2 + r_3 + r_5), (r_1 + r_2 + r_4 + r_6), (r_1 + r_3 + r_4 + r_7)]$. **(06 Marks)**

b. Consider a (7, 4) cyclic code with $g(x) = 1 + x + x^3$. Obtain the code polynomial in non systematic and systematic form for the input sequence.

(i) 1 0 1 0

(ii) 1 1 0 0 **(10 Marks)**

c. Write short notes on BCH codes. **(04 Marks)**

OR

10 a. For a (2, 1, 3) convolutional encoder with $g^{(1)} = 1\ 0\ 1\ 1$ and $g^{(2)} = 1\ 1\ 1\ 1$. Find the output sequence using the two following approaches:

(i) Time domain approach.

(ii) Transform domain approach.

Also draw the encoder diagram. **(10 Marks)**

b. For a (2, 1, 2) convolutional encoder with $g^{(1)} = [1\ 1\ 1]$, $g^{(2)} = [1\ 0\ 1]$

(i) Draw the transition table.

(ii) State diagram.

(iii) Draw code tree.

(iv) Using the code tree, find the encoded sequence for the message 1 0 1 1 1.

(v) Draw the Trellis diagram. **(10 Marks)**

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18EC55

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
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. State and explain Coulomb's Law. Also express in Vector form. **(06 Marks)**

b. Derive the expression for electric field intensity due to infinite line charges. **(08 Marks)**

c. Find the electric field at a point P(2, 15, 13)m due to the uniform line charge density ρ_L = 25nc. Given that a perpendicular to drawn from A meets the line charge at a point B(3, 0, 4)m. **(06 Marks)**

OR

2 a. A charge $Q_2 = 121 \times 10^{-9}$ C is located in free space at P_2(-0.03, 0.01, 0.04)m. Find the force on Q_2 due to Q_1 where $Q_1 = 110 \times 10^{-6}$C at P_1 (0.03, 0.08, -0.02)m. **(06 Marks)**

b. Define Electric Field Intensity. Derive the expression for Electric field at a point due to may charges. **(08 Marks)**

c. Derive the expression for field due to continuous volume charge distribution. **(06 Marks)**

Module-2

3 a. State and explain Gauss Law. **(06 Marks)**

b. Evaluate both sides of divergence theorem for the field $D = 2xy\overline{ax} + x^2\overline{ay}$ c/m^2 and the rectangular parallel piped formed by the planes x = 0 and y = 1, y = 0 and y = 2, z = 0 and 3. **(10 Marks)**

c. Show that electric field intensity is negative potential gradient. **(04 Marks)**

OR

4 a. Obtain the expression for the work done in moving a point charge in an electric field. **(06 Marks)**

b. Derive the expression for equation of continuity. **(08 Marks)**

c. Give $V = 2x^2y - 5z$ at point P(-4, 3, 6). Find the potential, electric field intensity and volume charge density. **(06 Marks)**

Module-3

5 a. Solve the Laplace's equation to find the potential field in the homogeneous region between the two concentric conducting sphere with radii a and b such that b > a. If potential V = 0 at r = b and $V = V_o$ at r = a. Also find Electric field intensity. **(10 Marks)**

b. If the magnetic field intensity in a region is H = (3y – 2)az + 2 ×ay. Find the current density at the origin. **(04 Marks)**

c. State and explain Biot – Savart's law. **(06 Marks)**

OR

6 a. State and prove Uniqueness theory. **(08 Marks)**

b. Determine whether or not the following potential fields satisfy the Laplace's equation.
i) $V = x^2 - y^2 + z^2$ ii) $V = r\cos\phi + z$. **(08 Marks)**

c. Explain the concepts of Scalar Potential. **(04 Marks)**

Module-4

7 a. Derive an expression for force between differential current elements. **(06 Marks)**

b. Obtain the boundary conditions at the interface between two magnetic materials. **(10 Marks)**

c. Find the magnetization in a magnetic material, where

i) $\mu = 1.8 \times 10^{-5}$ H/m and H = 120 A/m ii) B = 300μT and suspectibility = 15. **(04 Marks)**

OR

8 a. State and explain Faraday's law of Electromagnetic Induction. Show its equation in differential form and integral form. **(10 Marks)**

b. A point charge Q = 18nc has a velocity of 5 × 106 m/s in the direction $a_v = 0.6\overline{a_x} + 0.75\overline{a_y} + 0.3\overline{a_z}$. Calculate the magnitude of force exerted on the charge by the field i) $\overline{E} = -3\overline{a_x} + 4\overline{a_y} + 6\overline{a_z}$ Kv/m ii) $\overline{B} = -3a_x + 4\overline{a_y} + 6\overline{a_z}$ MT

iii) $\overline{B}$ and $\overline{E}$ acting together. **(06 Marks)**

c. A conductor of length 4m long lies along the Y – axis with a current of 10 Amp in the $\overline{a_y}$ direction. Find the force on the conductor if the field in the region is B = $0.005\overline{a_x}$ tesla. **(04 Marks)**

Module-5

9 a. What is meant by Uniform Plane Wave? Derive the expression for Uniform Plane Wave in the free space. **(10 Marks)**

b. Let $\mu = 10^{-5}$H/m, $\epsilon = 4 \times 10^{-9}$F/m, σ = 0 and $\rho_v = 0$. Determine 'K' so that each of the following pair of fields satisfies Maxwell's equation :

i) $\vec{D} = 2x\hat{a}_x - 3y\hat{a}_y + 4z\hat{a}_z$ nC/m^2, $\vec{H} = Kx\hat{a}_x + 10y\hat{a}_y - 25z\hat{a}_z$ A/m

ii) $\vec{E} = (20y - kt)\hat{a}_x$ V/m, $\vec{H} = (y + 2\times10^6 t)\hat{a}_z$ A/m. **(10 Marks)**

OR

10 a. State and explain Poynting's theorem. **(10 Marks)**

b. Discuss Wave propagation in good conducting medium. **(06 Marks)**

c. Find the frequency at which conduction current density and displacement current density are equal in a medium with $\sigma = 2 \times 10^{-4}$ ℧/m and $\varepsilon_r = 81$. **(04 Marks)**

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18EC56

Fifth Semester B.E. Degree Examination, Feb./Mar. 2022
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 a typical design flow for designing VLSI IC circuits using the block diagram. (10 Marks)

b. Explain the importance of HDLs. (05 Marks)

c. Explain the trends in HDLs. (05 Marks)

OR

2 a. Explain the different levels of abstraction used for programming in verilog. (08 Marks)

b. Write the verilog code for 4-bit ripple carry counter. Also write the stimulus. (12 Marks)

Module-2

3 a. Explain the components of verilog module with block diagram. (06 Marks)

b. Explain the following data types with an example in verilog.
i) Registers ii) Arrays iii) Parameters iv) Nets v) Integers. (10 Marks)

c. Explain the port connection rules in verilog. (04 Marks)

OR

4 a. Write the verliog description of SR latch. Also write stimulus code. (10 Marks)

b. Explain $display, $monitor, $finish and $stop system tasks with examples. (10 Marks)

Module-3

5 a. What are rise, fall and turn off delays? How they are specified in verilog? (06 Marks)

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

c. Mention the symbol, truth table and an example for BUFIF1 and BUFIF0 primitive gates. (06 Marks)

OR

6 a. Design AOI based 4 to 1 multiplexer and write the verilog description and its stimulus. (10 Marks)

b. Write the verilog data flow description for 4-bit full adder with carry look ahead logic. (10 Marks)

Module-4

7 a. Explain blocking and non-blocking assignments with an example. (10 Marks)

b. Write a verilog code for clock generation with a period of 20 units using forever loop. (05 Marks)

c. Write the differences between the tasks and functions. (05 Marks)

OR

8 a. Discuss sequential and parallel blocks with examples. (10 Marks)

b. Write a verilog program for 8 : 1 multiplexer using case statement. (10 Marks)

Module-5

9 a. Write the verilog description for D – flipflop using assign and deassign procedural continuous assignments. **(10 Marks)**

b. Explain defparam statement with an example. **(10 Marks)**

OR

10 a. What is logic synthesis? Explain the flow diagram for the designer's mind as the logic synthesis tool. **(10 Marks)**

b. What will be the following statements translate to when run on a logic synthesis tool :
Assign {C-out, sum } = a + b + C in ;
Assign out = (s) ? i1 : i0 ; **(10 Marks)**

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