CBCS SCHEME

USN | | | | | | | | | | |

18ES51

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023
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. Explain the various functions of Management. **(07 Marks)**

b. Describe the various roles of a Manager. **(07 Marks)**

c. Distinguish between Management and Administration. Draw the diagram for time spent in administrative and managerial functions at different levels. **(06 Marks)**

OR

2 a. Define planning. Describe the importance of planning. **(08 Marks)**

b. Explain all the steps in Rational Decision making with a neat diagram. **(08 Marks)**

c. Give the differences between programmed and non-programmed decisions. **(04 Marks)**

Module-2

3 a. Explain the span of management concept its meaning and importance. **(05 Marks)**

b. Define committee. Explain the different types of committees. **(05 Marks)**

c. What is Recruitment? Explain the steps in the selection process. **(10 Marks)**

OR

4 a. Write about the requirements of effective direction. **(08 Marks)**

b. Discuss Autocratic, Democratic and Free rein Leadership styles. **(08 Marks)**

c. Explain the meaning of control. Write the benefits of control. **(04 Marks)**

Module-3

5 a. Explain the meaning of social responsibility. Describe the social responsibilities of Business towards consumer and community. **(06 Marks)**

b. What is Social Audit? What are its benefits and limitations? **(07 Marks)**

c. What is Corporate Governance? List the benefits of good Corporate Governance. **(07 Marks)**

OR

6 a. Define Entrepreneurship. Explain the different types of Entrepreneurs. **(08 Marks)**

b. Explain Entrepreneurial development cycle. **(07 Marks)**

c. List and explain any five characteristics of an entrepreneur. **(05 Marks)**

Module-4

7 a. Define Family Business. Explain the characteristics of a family owned business in India. **(07 Marks)**

b. Explain the various types of family businesses. **(07 Marks)**

c. Write the contributions of family businesses in India. Also explain the stages of development of family business. **(06 Marks)**

OR

8 a. Explain the ways of generating business ideas. **(08 Marks)**

b. Explain how to identify a business opportunity. **(06 Marks)**

c. Explain the concept of Financial Feasibilities. **(06 Marks)**

Module-5

9 a. What is the purpose of a Business plan? Explain. Also write the reasons for preparing a business plan. **(07 Marks)**

b. Why do some business plans fail? Explain. **(07 Marks)**

c. Explain the following terms:
i) Venture capital
ii) Angel Investing **(06 Marks)**

OR

10 a. Explain the six stages of venture capital financing as identified by Tyebjee and Bruno. **(08 Marks)**

b. Discuss the steps in PERT network analysis technique. What are its advantages? **(08 Marks)**

c. List differences between PERT and CPM. **(04 Marks)**

* * * * *

CBCS SCHEME

USN | 1 | K | S | 1 | 8 | E | C | 0 | 1 | 3 |

18EC52

Fifth Semester B.E. Degree Examination, Jan./Feb. 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. State and prove circular time shift property. **(06 Marks)**

b. Find the 4-point DFT of the sequence $x(n) = \text{Cos}\left(\frac{\pi}{4}n\right) + \text{Sin}\left(\frac{\pi}{4}n\right)$ use linearity property. **(08 Marks)**

c. Consider 4-point sequences $x(n) = \text{Cos}\left(\frac{\pi n}{2}\right); 0 \le n \le 3$

$h(n) = 2^n; \ 0 \le n \le 3$

Compute circular convolution. Using concentric circle method. **(06 Marks)**

OR

2 a. State and prove Parseval's theorem. **(06 Marks)**

b. Find 6- point DFT of the sequence

$x(n) = n; \quad 0 \le n \le 5$

$= 0; \quad$ otherwise **(08 Marks)**

c. Find the IDFT of the DFT $X(K) = \{6, -2+j2, -2, -2-j2\}$. **(06 Marks)**

Module-2

3 a. Consider a FIR with filter whose 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 using over lap add method assuming the length of block as 7. **(10 Marks)**

b. Develop Radix- 2 DIT-FFT algorithm and draw complete signal flow graph for N = 8. **(10 Marks)**

OR

4 a. Find the output y(n) of a filter whose impulse response in $h(n) = \{1, 1, 1\}$ and the input signal to the filter is $x(n) = \{3, -1, 0, 1, 3, 2, 0, 1, 2, 1\}$. Using overlap save method. **(10 Marks)**

b. First five point of the Eight point DFT of a real valued sequence is given by

$x(0) = 0, \qquad x(3) = 2-2j$

$x(1) = 2 + 2j \quad x(4) = 0$

$x(2) = -j4$

Determine the remaining points. Hence find the original sequence x(n) using Decimation in frequency FFT algorithm. **(10 Marks)**

Module-3

5 a. List the different types of windowing techniques used in the design of FIR filters. Write the analytical equations, draw the magnitude response and show the largest side lobe value below the dc magnitude. **(08 Marks)**

b. The frequency response of an FIR filter is given by

$H(\omega) = e^{-j3\omega}(1 + 1.8\cos 3\omega + 1.2\cos 2\omega + 0.5\cos\omega)$

Determine the coefficient of the impulse response h(n) of the FIR filter. **(06 Marks)**

c. Determine the coefficient K_m of the lattice filter corresponding to FIR filter described by the system function $H(z) = 1 + 2z^{-1} + \frac{1}{3}z^{-2}$. And also draw the Lattice structure. **(06 Marks)**

OR

6 a. Determine the filter coefficient $h_d(n)$ for the desired frequency response of a Lowpass filter is given by

$$H_d(w) = \begin{cases} e^{-j2w} & ; \quad -\frac{\pi}{4} \le w \le \frac{\pi}{4} \\ 0 & ; \quad \frac{\pi}{4} \le w \le \pi \end{cases}$$

Find h(n) and also frequency response H(w) using Hamming window. **(10 Marks)**

b. Obtain the cascade form realization of system function :

$H(z) = 1 + 5z^{-1} + 2z^{-2} + 2z^{-3}$ **(05 Marks)**

c. Realize the following function in Direct form.

$$H(z) = \left(1 + \frac{1}{2}z^{-1} + z^{-2}\right)\left(1 + \frac{1}{4}z^{-1} + z^{-2}\right)$$ **(05 Marks)**

Module-4

7 a. Discuss the general procedure for IIR filter design using Bilinear transformation. **(06 Marks)**

b. An analog filter is given by $H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 16}$. Obtain digital IIR filter using bilinear transformation method. Digital filter is to have resonant frequency $\omega_r = \frac{\pi}{2}$ radians. **(08 Marks)**

c. Compare FIR and IIR filter. **(06 Marks)**

OR

8 a. Design a Butterworth digital low pass filter with the following specifications.

i) 3dB attenuation at the passband frequency of 1.5KHz
ii) 10dB stopband attenuation at the frequency of 3KHz
iii) Sampling frequency of 8000Hz. **(10 Marks)**

b. A system is represented by a transfer function H(z) is given by $H(z) = 1 + \frac{4z}{z - \frac{1}{2}} - \frac{2}{z - \frac{1}{4}}$

i) Does this H(z) represent a FIR or IIR filter? Why?
ii) Draw direct form – I and Direct form – II realization by showing all differences equations? **(10 Marks)**

Module-5

9 a. Explain IEEE floating point formats using :

i) Single precision format ii) Double precision format. **(08 Marks)**

b. Discuss briefly multiplier and Accumulator unit in Digital signal processor hardware units. **(04 Marks)**

c. Draw the block diagram to TMS320C3X floating point digital signal processor. **(08 Marks)**

OR

10 a. With block diagram explain Digital signal processor based on Harvard architecture. **(06 Marks)**

b. Convert the Q-15 signed number to decimal numbers.

i) 1.110101110000010 ii) 0.100011110110010 **(04 Marks)**

c. Explain the basic architecture of TMS320CS54X used in fixed point Digital signal processor. **(10 Marks)**

CBCS SCHEME

USN | | | | | | | | | | |

18EC53

Fifth Semester B.E. Degree Examination, Jan./Feb. 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. With proper necessary equations, explain the time domain and frequency domain expressions for an AM wave. Outline the waveforms and spectrum. **(08 Marks)**

b. Explain the generation of AM wave using switching modulator with neat block diagram and relevant equations. **(08 Marks)**

c. An audio frequency signal $10\sin 2\pi(500t)$ is used to amplitude modulate a carrier signal of $50\sin 2\pi(10^5 t)$. Assume modulation index as 0.2. Determine

(i) Side band frequencies.
(ii) Amplitude of each sideband.
(iii) Band width required. **(04 Marks)**

OR

2 a. What is a coherent detector used for DSB.SC? Why it is so named? Explain its working with a neat block diagram. What can be the problems in a coherent detector? **(08 Marks)**

b. Compare and contrast standard AM, DSB-SC, SSB-SC and VSB-SC (at least 5 points in each) **(05 Marks)**

c. When the modulation percentage is 75 an AM transmitter produces 10 kW. How much of this is carrier power? Determine the percentage of power saving if the carrier and one of the sidebands were suppressed before transmission took place. **(07 Marks)**

Module-2

3 a. From the fundamentals deduct an expression of WBFM and plot its frequency spectrum. **(10 Marks)**

b. What is frequency modulation? Deduct the expression for a narrow band FM signal. Represent a narrow band FM signal with neat phasor diagram. **(08 Marks)**

c. A FM signal has sinusoidal modulation with $W = 15$ kHz and modulation index $\beta = 2$. Using Carson's rule determine the transmission bandwidth and deviation ratio. Assume $\Delta f = 75$ kHz. **(02 Marks)**

OR

4 a. With relevant mathematical analysis and block diagrams show the reconstruction of message signal from FM wave using PLL. **(10 Marks)**

b. Explain the generation of FM wave using a neat block diagram and necessary equations. **(06 Marks)**

c. A Carrier is frequency modulated by a sinusoidal modulating signal of frequency 3 kHz resulting in a frequency deviation of 10 kHz.

(i) What is the bandwidth occupied by the modulated waveform?
(ii) If the amplitude of the modulating signal is increased by a factor of 2 and its frequency is lowered to 1 kHz. Determine the new bandwidth. **(04 Marks)**

Module-3

5 a. What is thermal Noise? List out different characteristics of thermal Noise. (06 Marks)

b. What is white noise? Deduct the power spectral density and auto-correlation function for a RC-Low pass filtered white Noise. Also find the Noise equivalent bandwidth for the same and show its relationship with normal bandwidth. (08 Marks)

c. Explain the applicability of pre-emphasis and de-emphasis with respect to FM system. (06 Marks)

OR

6 a. Determine the FOM for a DSB-SC receiver. (08 Marks)

b. Determine the FOM for a standard AM receiver. (08 Marks)

c. Explain capture effect and threshold effect with respect to FM receiver. (04 Marks)

Module-4

7 a. What are the advantages of digital modulation techniques over analog? (04 Marks)

b. What is sampling theorem? Explain sampling with neat sketches and equations. What are the challenges faced with Nyquist criteria of sampling? (08 Marks)

c. What is Flat top sampling writ PAM. Explain the same with neat waveforms and derive the equation for flat-top sampled PAM. (08 Marks)

OR

8 a. What is multiplexing and why it is required in communication? Explain the working of TDM with neat block diagram. (08 Marks)

b. What is pulse position modulation? Explain the generation of a PPM wave with neat block diagram and necessary waveforms. (08 Marks)

c. What is aperture error in PAM? How to minimize it? (04 Marks)

Module-5

9 a. What is Quantization? Why it is required in digital communication? Explain symmetric quantizer of midtread and midrise type. (08 Marks)

b. With neat block diagram, explain the working of PCM system. (08 Marks)

c. What is companding? Explain different laws of companding. (04 Marks)

OR

10 a. What is Quantization noise? Derive the expression for O/P signal to Noise Ratio of a Quantizer. Consider a sinusoidal modulating signal of amplitude AM which uses all representation levels provided. Calculate the $(SNR)_O$ for the O/P of quantizer of the above signal. (08 Marks)

b. What is Delta modulation? Explain the same with block diagrams. (06 Marks)

c. Write a note on Vocadens. (06 Marks)

* * * * *

CBCS SCHEME

USN | 1 | U | S | 2 | 0 | E | C | 0 | 0 | 9 |

18EC54

Fifth Semester B.E. Degree Examination, Jan./Feb. 2023
Information Theory & 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 the followings:
(i) Entropy
(ii) Information rate.
(iii) Self information. **(06 Marks)**

b. A binary source is emitting an independent sequence of 0's and 1's with probability of P and 1-P respectively. Plot the Entropy of this source versus P (0<P<1). **(06 Marks)**

c. For the first order Markov statistical model shown in Fig. Q1 (c). Compute
(i) Probabilities of each state.
(ii) H(s) and $H(s^{-2})$

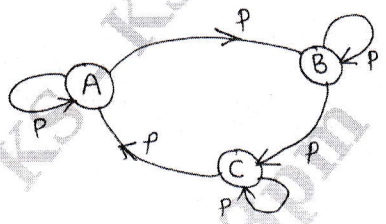

Fig. Q1 (c) **(08 Marks)**

OR

2 a. For the first order Markoff model shown in Fig. Q2 (a). Find
(i) Entropy of each state.
(ii) Entropy of the source.
(iii) Prove that $G_1 \geq G_2 \geq H$

Assume $P(1) = P(2) = P(3) = \frac{1}{3}$

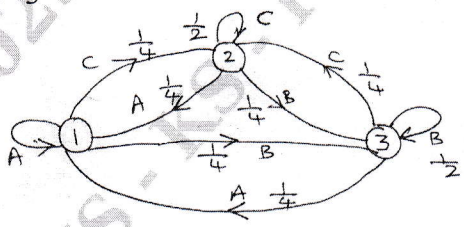

Fig. Q2 (a) **(12 Marks)**

b. The international Morse code uses a sequence of dots and dashes to transmit letters of the English alphabets. The dash represented by a current pulse that has a durationof 3 units and the dot has a duration of 1 unit. The probability of a dash is $\frac{1}{3}$ of the probability of occurrence of a dot.
(i) Calculate the information content of a dot and a dash.
(ii) Calculate H(s) in the dot-dash code.
(iii) Assume that the dot lasts 1 msec.
Which is the same time interval as the pause between symbols? Find the average rate of information transmission. **(08 Marks)**

Module-2

3 a. Construct a binary Shannon encoding algorithm for the following source with probabilities:
S = {A, B, C, D, E}
P = {0.4, 0.25, 0.15, 0.12, 0.08}
Also compute the code Efficiency. **(08 Marks)**

b. What is prefix of a code and explain with example. **(04 Marks)**

c. Construct a Ternary code using Huffman Encoding algorithm for the source given with probabilities and move the composite symbol as low as possible.

Symbol :	A	B	C	D	E	F	G
Probabilities :	$\frac{1}{3}$	$\frac{1}{27}$	$\frac{1}{3}$	$\frac{1}{9}$	$\frac{1}{9}$	$\frac{1}{27}$	$\frac{1}{27}$

Also find the code efficiency. **(08 Marks)**

OR

4 a. Check the following codes given in Table (1) are instantaneous or not with the help of KMI.

Symbols	Code A	Code B	Code C
A	0	0	00
B	10	11	01
C	110	100	10
D	1110	110	111
E	1111	1011	0110

Table (1) **(09 Marks)**

b. Design a source Encoder using Shannon encoding algorithm for the information source shown in Fig.Q4 (b). Compute the average output bit rate and efficiency of the code for N = 1. Assume $P_1 = P_2 = \frac{1}{2}$.

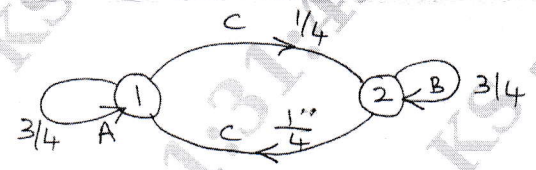

Fig. Q4 (b) **(11 Marks)**

Module-3

5 a. Define the followings:
(i) Channel matrix.
(ii) Joint probability matrix.
(iii) Input entropy.
(iv) Output entropy. **(08 Marks)**

b. What is mutual information? Prove that $I(X,Y) \geq 0$. **(08 Marks)**

c. Determine the capacity of the channel shown in Fig. Q5 (c).

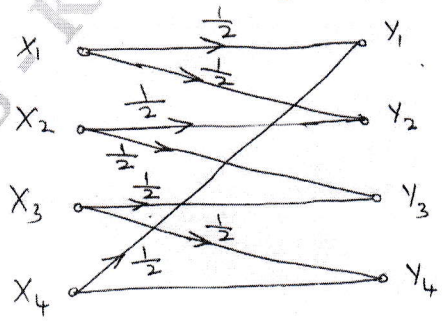

Fig. Q5 (c) **(04 Marks)**

OR

6 a. Consider a channel matrix, $P\left(\frac{Y}{X}\right)=\begin{bmatrix}0.6 & 0.2 & 0.2\\ 0.2 & 0.6 & 0.2\\ 0.2 & 0.2 & 0.6\end{bmatrix}$

with $P(X_1)=P(X_2)=P(X_3)=\frac{1}{3}$

Find H(X), H(Y), H(X,Y), $H\left(\frac{Y}{X}\right)$ and $H\left(\frac{X}{Y}\right)$. **(08 Marks)**

b. The noise characteristic of a channel as shown in Fig. Q6 (b). Find the capacity of a channel using Muruga's method. Assume r_s = 1500 symbols/sec.

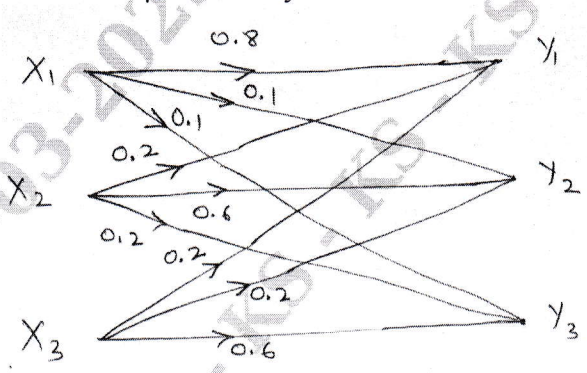

Fig. Q6 (b) **(08 Marks)**

c. Explain Binary Erasure channel. **(04 Marks)**

Module-4

7 a. Define the following:

(i) Hamming weight.
(ii) Hamming distance.
(iii) Minimum distance. **(06 Marks)**

b. For a (6, 3) linear block code, the parity matrix is,

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

(i) Obtain the generator matrix.
(ii) Write all possible code words.
(iii) If the received code vector R = 1 1 1 0 1 0, detect and correct the single error.
(iv) Draw the encoder and syndrome calculation block diagram. **(14 Marks)**

OR

8 a. A Generator polynomial for a (15, 7) cyclic code is $g(x)=1+x^4+x^6+x^7+x^8$.

(i) Find the code vector for the message $D(x)=x^2+x^3+x^4$ using encoder circuit.
(ii) Draw the syndrome calculation circuit and find the syndrome of the received polynomial.

$z(x)=1+x+x^3+x^6+x^8+x^9+x^{11}+x^{14}$ **(16 Marks)**

b. Mention the advantages and disadvantages of error control coding. **(04 Marks)**

Module-5

9 a. Consider the (3, 1, 2) convolution encoder with $g_{(1)} = 110$, $g_{(2)} = 101$ and $g_{(3)} = 111$

(i) Draw the encoder diagram.

(ii) Find the code word for the message sequence (11101) using generator matrix/matrix method.

(iii) Find the code word for the message sequence (11101) using transform domain approach. **(16 Marks)**

b. What are convolution codes? How it is different from block codes. **(04 Marks)**

OR

10 The (2, 1, 2) convolution encoder shown in Fig. Q10.

(i) Draw state transition table.

(ii) State diagram.

(iii) Draw the code tree and find the encoder output produced by the message (110)

(iv) Construct a Trellis diagram and find the encoder output produced by the message (110)

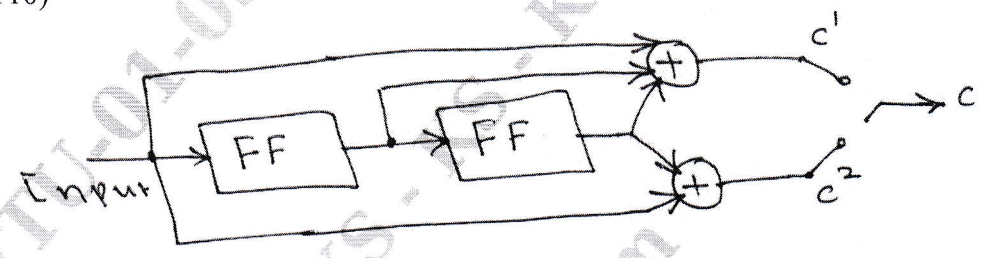

Fig. Q10 **(20 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18EC55

Fifth Semester B.E. Degree Examination, Jan./Feb. 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. The three vertices of a triangle are located at A(6, −1, 2), B(−2, 3, −4) and C(−3, 1, 5). Find (i) $R_{AB} \times R_{AC}$ (ii) Area of triangle **(04 Marks)**

b. Define Electric field intensity. Derive the expression for electric field intensity due to infinite line charge. **(10 Marks)**

c. Given the electric flux density $\bar{D} = 0.3r^2\bar{a}_r nC/m^2$ in free space.
(i) Find E at point $P(r = 2, \theta = 25^\circ, \phi = 90^\circ)$.
(ii) Find total charge within the sphere r = 3.
(iii) Find total electric flux learing the sphere r = 4. **(06 Marks)**

OR

2 a. Four identical 3nC (nano Coulomb) charges are located at $P_1(1, 1, 0)$, $P_2(-1, 1, 0)$, $P_3(-1, -1, 0)$ and $P_4(1, -1, 0)$. Find the electric field intensity $\bar{E}$ at P(1, 1, 1). **(10 Marks)**

b. Infinite uniform line charges of 5 nC/m lie along the (positive and negative) x and y axes in free space. Find $\bar{E}$ at $P_A(0, 0, 4)$. **(04 Marks)**

c. Define Coulomb's law. Make use of this to find the force on Q_1. Given that the point charges $Q_1 = 50\,\mu C$ and $Q_2 = 10\,\mu C$ are located at $(-1, 1, -3)$m and $(3, 1, 0)$m respectively. **(06 Marks)**

Module-2

3 a. Explain Gauss law applicable to the case of infinite line charge and derive the relation used. **(08 Marks)**

b. Evaluate both sides of the divergence theorem for the field $\bar{D} = 2xy\bar{a}_x + x^2\bar{a}_y$ C/m² and the rectangular parallelepiped formed by the places x = 0 and 1, y = 0 and 2 and z = 0 and 3. **(08 Marks)**

c. Given the potential field $V = 2x^2y - 5z$ and point P(−4 3 6). (i) Find potential V at P. (ii) Field intensity $\bar{E}$, (iii) Volume charge density ρ_V. **(04 Marks)**

OR

4 a. Compute the numerical value for div $\bar{D}$ at the point specified below:
$\bar{D} = (2xyz - y^2)\bar{a}_x + (x^2z - 2xy)\bar{a}_y + x^2y\bar{a}_z$ C/m² at $P_A(2, 3, -1)$ **(04 Marks)**

b. Show that Electric field is a negative gradient of potential. **(08 Marks)**

c. Let $E = y\bar{a}_x$ V/m at a certain instant of time and calculate the work required to move a 3c charge from (1, 3, 5) to (2, 0, 3) along the straight line segment joining
(i) (1, 3, 5) to (2, 3, 5) to (2, 0, 5) to (2, 0, 3)
(ii) (1, 3, 5) to (1, 3, 3) to (1, 0, 3) to (2, 0, 3) **(08 Marks)**

Module-3

5 a. Solve the Laplace's equation for the potential field in the homogenous region between the two concentric conducting spheres with radii 'a' and 'b' such that b>a, if potential V = 0 at r = b and $V = V_0$ at r = a. Also find the capacitance between two concentric spheres. **(10 Marks)**

b. State and explain Biot-Savart law applicable to magnetic field. **(06 Marks)**

c. Calculate the value of vector current density in a rectangular coordinates at $P_A(2, 3, 4)$ if $\bar{H} = x^2 z\bar{a}_y - y^2 x\bar{a}_z$. **(04 Marks)**

OR

6 a. State and illustrate uniqueness theorem. **(08 Marks)**

b. Define Stoke's theorem. Use this theorem to evaluate both sides of the theorem for the field $\bar{H} = 6xy\bar{a}_x - 3y^2\bar{a}_y$ A/M and the rectangular path around the region, $2 \le x \le 5$, $-1 \le y \le 1$ $z = 0$. Let the positive direction of ds be $\bar{a}_z$. **(12 Marks)**

Module-4

7 a. Obtain the expression for magnetic force between differential current elements. **(06 Marks)**

b. Derive the boundary conditions to apply to $\bar{B}$ and $\bar{H}$ at the interface between two different magnetic materials. **(08 Marks)**

c. The point charge $\theta = 18nC$ has a velocity of 5×10^6 m/s in the direction.
$\bar{a}_v = 0.60\bar{a}_x + 0.75\bar{a}_y + 0.30\bar{a}_z$
Calculate the magnitude of the force exerted on the charge by the field,

(i) $\bar{B} = -3\bar{a}_x + 4\bar{a}_y + 6\bar{a}_z$ mT

(ii) $\bar{E} = -3\bar{a}_x + 4\bar{a}_y + 6\bar{a}_z$ kV/m

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

OR

8 a. Find the magnetization in a magnetic material, where

(i) $\mu = 1.8\times10^{-5}$ H/m and H = 120 A/m

(ii) $\mu_r = 22$, there are 8.3×10^{28} atoms/m^3, and each atom has a dipole moment of 4.5×10^{-27} A.m^2

(iii) $B = 300\,\mu T$ and $\chi_m = 15$. **(06 Marks)**

b. Let permittivity be 5 μH/m in region A where x < 0 and 20 μH/m in region B, where x > 0. If there is a surface current density $\bar{K} = 150\bar{a}_y - 200\bar{a}_z$ A/m at x = 0, and if $H_A = 300\bar{a}_x - 400\bar{a}_y + 500\bar{a}_z$ A/m. Compute

(i) $|H_{tA}|$ (ii) $|H_{NA}|$ (iii) $|H_{tB}|$ (iv) $|H_{NB}|$ **(08 Marks)**

c. State and explain Faraday's law of electromagnetic induction. **(06 Marks)**

Module-5

9 a. List and explain Maxwell's equations in point and integral form. **(08 Marks)**

b. The time domain expression for the magnetic field of a uniform plane wave travelling in free space is given by,

$H(z,t) = \bar{a}_y 2.5\cos(1.257\times10^9 t - K_0 z)$ mA/m.

Compute

(i) The direction of wave propagation.

(ii) Operating frequency

(iii) Phase constant.

(iv) The time domain expression for electric field E(z,t) starting from the Maxwell's equations.

(v) The phasor form of both the electric and magnetic field. **(10 Marks)**

c. For silver the conductivity is $\sigma = 3\times10^6$ S/m. At what frequency will the depth of penetration be 1 mm. **(02 Marks)**

OR

10 a. State and explain Poynting theorem and write the equation both in point and integral form. **(08 Marks)**

b. Simplify the value of K to satisfy the Maxwell's equations for region $\sigma = 0$ and $\rho_v = 0$ if $\bar{D} = 10x\bar{a}_x - 4y\bar{a}_y + kz\bar{a}_z \ \mu C/m^2$ and $\bar{B} = 2\bar{a}_y$ mT. **(06 Marks)**

c. A plane wave of 16 GHz frequency and E = 10 V/m propagates through the body of salt water having constant $\varepsilon_r = 100$, $\mu_r = 1$ and $\sigma = 100$ s/m. Determine attenuation constant, phase constant, phase velocity and intrinsic impedance and depth and penetration. **(06 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

18EC56

Fifth Semester B.E. Degree Examination, Jan./Feb. 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 circuit using the flow chart. **(08 Marks)**

b. i) A 4-bit ripple carry adder (Ripple – Add) contains four 1-bit full adders (FA). Define the module FA. Do not define the internals or the terminal list. Define the module Ripple – Add. Do not define the internals or the terminal list. Instantiate four full adder of the type FA in the module Ripple-Add and call them fa0, fa1, fa2, and fa3.

ii) Define the module IS, using the module/endmodule keywords. Instantiate the modules MEM, Se, Xbar and call the instances mem1, se1 and Xbar 1, respectively. You do not need to define the internals. Assume that the module IS has no terminals. **(06 Marks)**

c. What are the two styles of stimulus applications? Explain each method in brief. **(06 Marks)**

OR

2 a. Explain the trends in HDL. **(04 Marks)**

b. With a hierarchical diagram of a 4-bit ripple carry counter, explain the design hierarchy **(10 Marks)**

c. What is the difference between a module and a module instance? Explain with an example. **(06 Marks)**

Module-2

3 a. Describe different methods of connecting parts to internal signals. **(06 Marks)**

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

c. What are the basic components of a module? Explain all the components of a verilog module with a neat diagram. **(06 Marks)**

OR

4 a. Declare the following variables in verilog.

i) An 8-bit vector net called a – in

ii) A 16-bit hexadecimal unknown number with all x's

iii) A memory MEM containing 256 words of 64 bits each

iv) A parameter cache-size equal to 512. **(04 Marks)**

b. With example explain different types of lexical conventions. **(08 Marks)**

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

Module-3

5 a. Write a verilog dataflow description for 4-bit full adder with carry lookahead. **(06 Marks)**

b. What would be the output of the following

a = 4'b1010 , b = 4'b1111

i) a&b (ii) a&&b (iii) &a (iv) a>>1 (v) a>>>1

(vi) y = {2{a}} (vii) a ∧ b (viii) z = {a, b} **(08 Marks)**

c. What re rise, fall and Turn-off delays? How they are specified in verilog? **(06 Marks)**

OR

6 a. A full subtractor has three 1-bit inputs x, y and z (previous borrow) and two 1-bit outputs D (Difference) and B (Borrow) the logic equations are

$D = \overline{X}\overline{Y}Z + \overline{X}Y\overline{Z} + X\overline{Y}\overline{Z} + XYZ$

$B = \overline{X}Y + \overline{X}Z + YZ$ **(06 Marks)**

Write veriolog description using dataflow modeling. Instantiate the subtractor inside a stimulus block and test all possible combinations of inputs X, Y and Z.

b. Discuss the And/or and Not gates with respect to logic symbols, gate instantiation and truth table. **(06 Marks)**

c. Design AND-OR-INVERT (AOI) based 4:1 multiplexer write verilog description for the same and its stimulus. **(08 Marks)**

Module-4

7 a. Explain the following assignment statements and non-blocking assignment statements with relevant examples. **(06 Marks)**

b. Write a veriolog program for 8-to-1 multiplexer using case statement. **(08 Marks)**

c. Give the differences between tasks and functions. **(06 Marks)**

OR

8 a. Explain sequential and parallel blocks with examples. **(06 Marks)**

b. Design a negative edge-triggered D-flipflp (DUFF) with synchronous clear, active high (D-FF clears only at a negative edge of clock when clear is high). Design a clock with a period of 10 units and test the D-flipflop. **(08 Marks)**

c. Write verilog program to call a function called calc-parity which computes the parity of a 32-bit data, [31-0] Data and display odd or even parity message. **(06 Marks)**

Module-5

9 a. Write a note on :

i) Force and release
ii) Defparam statement
iii) time scale
iv) file output. **(08 Marks)**

b. Write a note on verification of gate level netlist. **(04 Marks)**

c. With a neat flow chart explain computer Aided logic synthesis process. **(08 Marks)**

OR

10 a. What is logic synthesis? **(04 Marks)**

b. Interpret the following verilog constructs after logic synthesis.

i) The assign statement
ii) The if-else statement
iii) The case statement
iv) The always statement **(10 Marks)**

c. Write RTL description for magnitude comparator. **(06 Marks)**

* * * * *