CBCS SCHEME

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

18ES51

Fifth Semester B.E. Degree Examination, July/August 2022
Technological Innovation Management & 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 ten different roles played by managers. **(10 Marks)**
b. Explain different management levels and skills using skill-mix diagram. **(10 Marks)**

OR

2 a. Explain the hierarchy of organizational plans with the help of a diagram. **(10 Marks)**
b. Explain programmed and non-programmed decision making in management. **(10 Marks)**

Module-2

3 a. Explain the meaning and importance of span of management. **(10 Marks)**
b. Explain different sources of recruitment. **(10 Marks)**

OR

4 a. Explain Maslow's need-hierarchy motivational theory with the help of neat diagram. **(10 Marks)**
b. Explain five types of managerial styles using managerial grid chart. **(10 Marks)**

Module-3

5 a. Explain benefits and limitations of social audit. **(10 Marks)**
b. Explain Corporate governance in India. **(10 Marks)**

OR

6 a. Explain different types of entrepreneurs. **(10 Marks)**
b. Explain sociological models of entrepreneurial development. **(10 Marks)**

Module-4

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

OR

8 a. Explain different methods to generate business ideas. **(10 Marks)**
b. Explain external changes which leads to the creation of opportunities. **(10 Marks)**

Module-5

9 a. Explain executive summary and management summary of business plans. **(10 Marks)**
b. Explain government schemes for Micro, Small and Medium Enterprises (MSME). **(10 Marks)**

OR

10 a. Explain selection of a project for setting up an enterprise. **(10 Marks)**
b. Explain two important ways of raising long-term debt fund. **(06 Marks)**
c. List some advantages of PERT and CPM. **(04 Marks)**

* * * * *

CBCS SCHEME

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

18EC52

Fifth Semester B.E. Degree Examination, July/August 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. Compute N-point DFT of a sequence $x(n) = \frac{1}{2} + \frac{1}{2}\cos\left(\frac{2\pi}{N}\left(n - \frac{N}{2}\right)\right)$. **(10 Marks)**

b. Compute circular convolution using DFT and IDFT for the following sequences $x_1 = (1, 2, 3, 1)$ and $x_2(n) = \{4, 3, 2, 2\}$. **(10 Marks)**

OR

2 a. Obtain the relationship between DFT and Z-transform. **(10 Marks)**

b. Let x(n) be a real sequence of length N and its N-point DFT is x(k), show that

i) $X(N-K) = X^*(K)$

ii) $X(0)$ is real

iii) If N is even, then $X\left(\frac{N}{2}\right)$ is real. **(10 Marks)**

Module-2

3 a. Find the response of an LII system with an impulse response $h(n) = \{3, 2, 1\}$ for the input $x(n) = \{2, -1, -1, -2, -3, 5, 6, -1, 2, 0, 2, 1\}$ using overlap add method use 8-point circular convolution. **(10 Marks)**

b. Develop the radix-2 decimation in frequency FFT algorithm for N = 8 and draw the signal flow graph. **(10 Marks)**

OR

4 a. Find the output y(n) of a filter whose impulse response $h(n) = \{1, 2\}$ and the input signal to the filter is $x(n) = \{1, 4, 3, 2, 7, 4, -7, -7, -1, 3, 4, 3\}$ using overlap save method. Use only 5 point circular convolution approach. **(10 Marks)**

b. Using DIT-FFT algorithm, compute the DFT of a sequence $x(n) = (1, 1, 1, 1, 0, 0, 0, 0)$. **(10 Marks)**

Module-3

5 a. Let the coefficients a three stage FIR lattice structure be $K_1 = 0.1$, $K_2 = 0.2$ and $K_3 = 0.3$. Find the coefficients of the direct form – I FIR filter and draw its block diagram. **(10 Marks)**

b. A linear time-invariant system is described by the following input-output relation. $2y(n) - y(n-2) - 4y(n-3) = 3x(n-2)$. Realize the system in the following forms:

i) Direct form – I realization.

ii) Direct form – II realization. **(10 Marks)**

OR

6 a. The desired frequency response of a lowpass filter is given by

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

Determine the frequency response of the FIR filter it Hamming window is used with N = 7. **(10 Marks)**

b. Find the lattice-ladder structure for the filter given by the following difference equation:

$$y(n) + \frac{3}{4}(n-1) + \frac{1}{4}y(n-2) = x(n) + 2x(n-1).$$ **(10 Marks)**

Module-4

7 a. Obtain a parallel realization for the system for the system described by

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

b. Obtain the cascade realization of system
$H(z) = [2z^{-1} - z^{-2}] . [z^{-1} - z^{-2}]$. **(10 Marks)**

OR

8 a. Design a Butterworth analog high pass filter that will meet the following specifications:
i) Maximum passband attenuation = 2dB
ii) Passband edge frequency = 200rad/sec
iii) Minimum stopband attenuation = 20dB
iv) Stopband edge frequency = 100rad/sec. **(12 Marks)**

b. Realize the FIR filter whose transfer function is given by

$$H(z) = 1 + \frac{3}{4}z^{-1} + \frac{17}{8}z^{-2} + \frac{3}{4}z^{-3} + z^{-4}$$ using direct form – I. **(08 Marks)**

Module-5

9 a. Explain the digital signal processors based on the Harvard architecture. **(10 Marks)**

b. Find the signed Q-15 representation for the decimal number 0.560123. **(10 Marks)**

OR

10 a. Explain with neat block diagram floating point DS processor (TMS320C3X). **(10 Marks)**

b. Explain fixed-point digital signal processors (architecture of the TMS320C54X family). **(10 Marks)**

* * * * *

CBCS SCHEME

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

18EC53

Fifth Semester B.E. Degree Examination, July/August 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. Illustrate the item domain and frequency domain characteristics of standard amplitude modulation produced by a single tone. **(10 Marks)**

b. Explain switching modulator with circuit diagram and characteristic curve. **(10 Marks)**

OR

2 a. Explain the generation of DSBSC wave using a Ring modulator. **(07 Marks)**

b. Explain the scheme of generation and demodulation of VSB modulated wave with relevant spectrum of signals and mathematical expressions. **(07 Marks)**

c. Explain with block diagram of FDM system. **(06 Marks)**

Module-2

3 a. Explain with block diagram generation of FM wave using PM and PM wave using FM. **(07 Marks)**

b. Explain the indirect method of generation FM wave with relevant equation and diagram. **(07 Marks)**

c. Explain FM stereo multiplexing. **(06 Marks)**

OR

4 a. Derive the expression for Linear model of PLL. **(08 Marks)**

b. Explain with diagram for superheterodyne receiver. **(08 Marks)**

c. Determine the bandwidth of an FM signal. If the maximum value of the frequency deviation Δf is fixed at 75KHz for commercial FM broadcasting by radio and modulation frequency is W = 15KHz. Bycarson's rule. **(04 Marks)**

Module-3

5 a. Derive the expression for figure of merit for DSB-SC receiver. **(07 Marks)**

b. Write short notes on :
i) Shot noise
ii) Thermal noise
iii) Whit noise. **(06 Marks)**

c. Find figure of merit for single tone AM. **(07 Marks)**

OR

6 a. With FM receiver model, derive the expression for figure of merit. **(07 Marks)**

b. Briefly explain the following as applicable to FM
i) Pre–emphasis
ii) De-emphasis. **(06 Marks)**

c. Explain about FM threshold effect and its reduction method. **(07 Marks)**

Module-4

7 a. What are the advantages of digital signal over analog signal? **(06 Marks)**

b. State sampling theorem and explain same with neat sketches and equation. **(07 Marks)**

c. Explain with block diagram for TDM. **(07 Marks)**

OR

8 a. Explain with diagram the generation of PPM waves. **(07 Marks)**

b. Explain the detection of PPM waves. **(07 Marks)**

c. Explain the following terms :

i) Under sampling

ii) Over sampling

iii) Nyquist rate. **(06 Marks)**

Module-5

9 a. Explain the midtread and midrise related to quantization noise. **(06 Marks)**

b. Explain with diagram for pulse-code modulation. **(07 Marks)**

c. Explain Delta modulation with transmitter and receiver systems. **(07 Marks)**

OR

10 a. Explain the unipolar NRZ, polar NRZ and Bipolar RZ with an example. **(06 Marks)**

b. Write a note on MPEG + Video. **(07 Marks)**

c. Explain Linear prediction coding VOCODER. **(07 Marks)**

* * * * *

CBCS SCHEME

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

18EC54

Fifth Semester B.E. Degree Examination, July/August 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. Choose a facsimile transmission of a picture, which there are about 2.25×10^6 pixels/frame. For a good reproduction at the receiver 12 brightness levels are necessary. Assume all these levels are equally likely to occur. Find the rate of information if one picture is to be transmitted every 3 min. Also compute source efficiency. **(08 Marks)**

b. State and prove External property of Entropy. **(06 Marks)**

c. A zero memory source has alphabet S = {S_1 S_2 S_3} with P = $\left\{\frac{1}{2}, \frac{1}{4}, \frac{1}{4}\right\}$. Find the entropy of this source. Also determine the entropy of its 2nd extension and verify that $H(s^2) = 2H(s)$. **(06 Marks)**

OR

2 a. State and prove Extension of zero-memory source. **(08 Marks)**

b. For the first order Markoff source shown in Fig.Q2(b).
(i) Find the stationary distribution (ii) Find the entropy of each state and hence the entropy of the source (iii) Find the entropy of the adjoint source and verify that $H(s) < H(\bar{s})$.

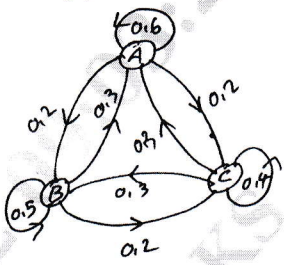

Fig.Q2(b) **(12 Marks)**

Module-2

3 a. Select a source S = {S_1 , S_2} with probabilities ¾ and ¼ respectively. Obtain Shannon Fano code for source S and its 2nd extension. Calculate efficiencies for each case. **(10 Marks)**

b. Construct Huffman Binary Code and determine its efficiency for a source with 8 alphabets A to H with probabilities of
0.22, 0.20, 0.18, 0.15, 0.10, 0.08, 0.05, 0.02 . **(10 Marks)**

OR

4 a. Apply Shannon encoding algorithm for the following message and obtain efficiency, redundancy and draw code tree.
S = {S_1 S_2 S_3 S_4}
P = {0.4, 0.3, 0.2, 0.1} **(10 Marks)**

b. Explain with examples Prefix Codes. (min 4 examples two not prefix and two prefix.) **(06 Marks)**

c. State and explain Kraft's inequality. **(04 Marks)**

Module-3

5 a. What is Mutual information? Mention its properties. **(04 Marks)**

b. The noise characteristics of a channel is as shown in Fig.Q5(b). Find the capacity of a channel using Muroga's method.

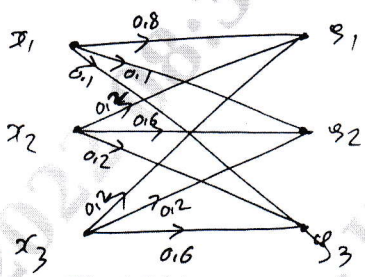

Fig.Q5(b) **(08 Marks)**

c. Explain Binary Symmetric and Binary Erroneous channel, with neat figure and JPM. **(08 Marks)**

OR

6 a. A binary symmetric channel has the following noise matrix

$$P(Y/X) = \begin{matrix} \\ x_1 \\ x_2 \end{matrix} \begin{matrix} \begin{matrix} y_1 & y_2 \end{matrix} \\ \begin{bmatrix} 3/4 & 1/4 \\ 1/4 & 3/4 \end{bmatrix} \end{matrix}$$

The source probabilities are $P(x_1) = 2/3$, $P(x_2) = 1/3$.

i) Determine H(x), H(y), H(x, y), H(y/x), H(x/y) and I(x,y)

ii) Find the channel capacity C

iii) Find channel η. **(08 Marks)**

b. What is Joint Probability matrix? Explain their properties. **(08 Marks)**

c. For the given channel matrix P(B/A), find H(B) by find P(A, B)

$$P(B/A) = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 1/4 & 3/4 & 0 & 0 \\ 0 & 1/3 & 2/3 & 0 \\ 0 & 0 & 1/3 & 2/3 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

The symbol probabilities are 0.2, 0.3, 0.2, 0.1 and 0.2. **(04 Marks)**

Module-4

7 a. Consider a (6, 3) linear block code whose generator matrix is given by

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

(i) Find all codewords.

(ii) Draw encoder circuit

(iii) Find minimum weight parity check matrix

(iv) Draw syndrome computation circuit. **(12 Marks)**

b. What is Syndrome Decoding Standard Array? Mention steps to decode using Syndrome Standard Array. **(08 Marks)**

OR

8 a. The generator polynomial of a (7, 4) cyclic code is $g(x) = 1 + x + x^3$, find the 16 code words of this code by forming the code polynomials V(x) using V(x) = D(x) g(x), where D(x) is message polynomial. **(10 Marks)**

b. For a (7, 4) cyclic code, the received vector Z(x) is 1110101 and the generator polynomial is $g(x) = 1 + x + x^3$. Draw the syndrome calculation circuit and correct the single error in the received vector. **(10 Marks)**

Module-5

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

(i) Draw encoder diagram

(ii) Find the code word for the message sequence (11101) using (a) Generator Matrix / time Domain approach and (b) Transformation approach. **(15 Marks)**

b. Explain Viterbi decoding Algorithm. **(05 Marks)**

OR

10 a. Explain importance of Convolution Code. **(05 Marks)**

b. Construct (2, 1, 3) convolution encoder circuit with $g^1 = 1011$ and $g^2 = 1101$ and obtain

(i) State diagram

(ii) Code tree

(iii) The encoder output produced by the message sequence 11101 by traversing the code tree. **(15 Marks)**

* * * * *

CBCS SCHEME

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

18EC55

Fifth Semester B.E. Degree Examination, July/August 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. Convert point P(1, 3, 5) from Cartesian to cylindrical and spherical coordinates. Also write the equation for differential surface and differential volume for cylindrical and spherical system. **(08 Marks)**

b. A line charge of 2 nc/m lies along y-axis while surface charge densities of 0.1 and -0.1 nc/m^2 exist on the plane z = 3 and z = -4 respectively. Find the electric field intensity at a point (1, -7, 2). **(06 Marks)**

c. A point charge of 50 nc each are located at A(1, 0, 0), B(-1, 0, 0), C(0, 1, 0) and D(0, -1, 0) in free space. Find the total force on the charge at A. **(06 Marks)**

OR

2 a. Compute the value of $\bar{E}$ at P(1, 1, 1) caused by four identical 3nc charges located at $P_1(1, 1, 0)$, $P_2(-1, 1, 0)$, $P_3(-1, -1, 0)$ and $P_4(1, -1, 0)$. **(08 Marks)**

b. Define electric field intensity and flux density. Derive the expression for electric field intensity due to several point charges. **(06 Marks)**

c. Calculate the total charge for the defined volume. Given that $0.1 \le |x|, |y|, |z| \le 0.2$

$$\rho_V = \frac{1}{x^3 y^3 z^3}$$ **(06 Marks)**

Module-2

3 a. Evaluate both sides of divergence theorem for the defined plane in which $1 \le x \le 2$, $2 \le y \le 3$, $3 \le z \le 4$. $\bar{D} = 4x\bar{a}_x + 3y^2\bar{a}_y + 2z^3\bar{a}_z$ c/m^2. **(10 Marks)**

b. Determine workdone in carrying a charge of -2c from (2, 1, -1) to (8, 2, -1) in the electric field $\bar{E} = y\bar{a}_x + x\bar{a}_y$ V/m, (in Cartesian system). **(05 Marks)**

c. Considering the path along the parabola $x = 2y^2$, obtain the equation of continuity in integral and differential form. **(05 Marks)**

OR

4 a. Let $V = \frac{\cos 2\phi}{r}$ in the free space in cylindrical system:

(i) Find $\bar{E}$ at B(2, 30°, 1)

(ii) Find the volume charge density at point A(0.5, 60°, 1) **(08 Marks)**

b. Calculate the numerical value for div $\bar{D}$ at the point P(2, 3, -1) for $\bar{D} = (2xyz - y^2)\bar{a}_x + (x^2z - 2xy)\bar{a}_y + x^2y\bar{a}_z$ c/m^2 **(06 Marks)**

c. Define potential difference. Derive the expression for potential due to several point charges. **(06 Marks)**

Module-3

5 a. Solve the Laplace's equation for the potential field in the homogeneous 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 the two concentric spheres. **(09 Marks)**

b. State and explain Biot-Savart law. **(05 Marks)**

c. If the magnetic field intensity in a region is $\overline{H} = (3y-2)\bar{a}_z + 2x\bar{a}_y$. Find the current density at the origin. **(06 Marks)**

OR

6 a. State and prove uniqueness theorem. **(07 Marks)**

b. Find $\overline{E}$ at P(3, 1, 2) for the field of two coaxial conducting cylinders V = 50 V at ρ = 2m and V = 20 V at ρ = 3m. **(06 Marks)**

c. Evaluate both side of the Stoke's theorem for the filed $\overline{H} = 6xy\bar{a}_x - 3y^2\bar{a}_y$ A/m and the rectangular path around the region $2 \le x \le 5$, $-1 \le y \le 1$, z = 0. Let the direction of $\overline{d}_s$ to be $\bar{a}_z$. **(07 Marks)**

Module-4

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

b. Calculate the normal components of the magnetic field which traversal from medium 1 to medium 2 having $\mu_{r_1} = 2.5$ and $\mu_{r_2} = 4$. Given that $\overline{H}_1 = -30\bar{a}_x + 50\bar{a}_y + 70\bar{a}_z$ V/m. **(06 Marks)**

c. Derive the integral and differential form of Faraday's law. **(08 Marks)**

OR

8 a. A current element $I_1 dL_1 = 10^{-4}\bar{a}_z$ Am is located at $P_1(2, 0, 0)$ and another current element $I_2 dL_2 = 10^{-6}[\bar{a}_x - 2\bar{a}_y + 3\bar{a}_z]$ Am is located at $P_2(-2, 0, 0)$. Both are in free space. Find:

(i) Force exerted on $I_2 dL_2$ by $I_1 dL_1$

(ii) Force exerted on $I_1 dL_1$ by $I_2 dL_2$ **(06 Marks)**

b. Calculate the magnetization in magnetic material where:

(i) $\mu = 1.8 \times 10^5$ (H/m) and M = 120 (A/m)

(ii) μ_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 (μT) and χ_m = 15. **(06 Marks)**

c. Obtain the magnetic boundary conditions at interface between two different magnetic material. **(08 Marks)**

Module-5

9 a. List and explain Maxwell's equation in point form and integral form. **(06 Marks)**

b. Calculate intrinsic impedance η_1 the propagation constant γ and wave velocity υ for a conducting medium in which σ = 58 Ms/m, μ_r = 1, ε_r = 1 at a frequency of 100 MHz. **(06 Marks)**

c. The $\overline{H}$ field in free space is given by $\overline{H}(x,t) = 10\cos(10^8 t - \beta x)\bar{a}_y$ A/m. Find β, λ and E(x, t) at P(0.1, 0.2, 0.3) and t = 1 ns. **(08 Marks)**

OR

10 a. State and prove Poynthing theorem. **(08 Marks)**

b. A metal sheet of aluminium has σ = 38.2 M $\mho$/m and μ_r = 1. Calculate the skin depth δ, propagation constant γ and velocity of propagation v at the frequency of 1.6 MHz. **(06 Marks)**

c. Do the field $\overline{E} = E_m \sin x \sin t\, \bar{a}_y$ and $\overline{H} = \frac{E_m}{\mu_0}\cos x \cos t\, \bar{a}_z$. Satisfy Maxwell's equation. **(06 Marks)**

CBCS SCHEME

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

18EC56

Fifth Semester B.E. Degree Examination, July/August 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. With neat block diagram of 4-bit Ripple carry counter. Explain the design hierarchy. **(10 Marks)**

b. Explain typical design flow for designing VLSI circuit, using the flow chart diagram. **(10 Marks)**

OR

2 a. What are the two styles of stimulus application? Explain each method in brief. **(08 Marks)**

b. Explain the following terms with examples : (i) module (ii) instances **(06 Marks)**

c. What are the advantages of verilog HDL? List out importance of HDL's. **(06 Marks)**

Module-2

3 a. What is ports? Explain the two methods of connecting Ports to external signals with examples. **(06 Marks)**

b. Explain the following data types with an example in verilog:
(i) Nets (ii) Register (iii) Vectors (iv) Parameters **(08 Marks)**

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

OR

4 a. What are the four values and eight strengths support in verilog HDL? List out in neat table. **(06 Marks)**

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

c. Declare following variables in verilog :
(i) Decimal number 123 as a sized 8 bit number in binary. Use for readability.
(ii) A 16-bit hexadecimal unknown number with all X's.
(iii) A 4-bit negative 2 in decimal. Write the 2's complement form for this number.
(iv) An unsized hex number 1234. **(06 Marks)**

Module-3

5 a. Write a verilog data flow description for 4-bit full adder with carry look ahead. **(10 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) $a \wedge b$ (viii) $z = \{a, b\}$ **(10 Marks)**

OR

6 a. Discuss AND/OR and NOT gates with respect to logic symbols, gate installation and truth table. **(10 Marks)**

b. Define butif/notif and write gate installation of bufit, notif gates. **(10 Marks)**

Module-4

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

b. Write a verilog program for 8 : 1 mux using case statement and test bends. **(08 Marks)**

c. Using forever statement, design a clock with period time = 10 and duty cycle = 40%, initial value of clock is 0. **(06 Marks)**

OR

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

b. Write the verilog behavioural description of a 4 bit binary counter with test cases. **(08 Marks)**

c. Using the for loop, initialize locations 0 to 1023 of a 4 bit register array cache_Var to 0. **(06 Marks)**

Module-5

9 a. Explain the synthesis flow for 4 bit magnitude comparator. **(10 Marks)**

b. Write a note on verification of gate-level netlist. **(10 Marks)**

OR

10 a. Write a note on : (i) Force and release (ii) defparam statement (iii) time scale (iv) file output **(10 Marks)**

b. Define the term logic synthesis with neat flow chart, explain computer Aided logic synthesis process. **(10 Marks)**

* * * * *