

# CBCS SCHEME

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18EC52

**Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025**

## 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 the following signals :
  - i)  $x(n) = a^n, 0 \leq n \leq N-1$
  - ii)  $x(n) = 1, 0 \leq n \leq N-1$ . (10 Marks)
- b. Determine 4-point circular convolution of the sequences.  
 $x_1(n) = \{2, 1, 2, 1\}$  and  $x_2(n) = \{1, 2, 3, 4\}$  using graphical method. (05 Marks)
- c. Compute the DFT of the sequence defined by  $x(n) = (-1)^n$  for i)  $N = 3$  ii)  $N = 4$ . (05 Marks)

**OR**

- 2 a. Illustrate the following properties of DFT :
  - i) Linearly
  - ii) Circular time shift (10 Marks)
- b. Compute the IDFT of 4-point sequence :  
 $X(K) = \{4, -j2, 0, j2\}$  using DFT. (10 Marks)

### Module-2

- 3 a. Develop radix - 2 decimation - in - time FFT algorithm and write signal flow graph for  $N = 8$ . (10 Marks)
- b. i) Compute the 4-point DFT of the sequence  $x(n) = \{1, 0, 1, 0\}$  using DIT FFT radix - 2 algorithm. (10 Marks)
- ii) Find  $x(n)$  for  $X(K)$  found in part(i) by DIF FFT algorithm. (10 Marks)

**OR**

- 4 a. Find the o/p  $y(n)$  of a filter whose impulse response is  $h(n) = \{3, 2, 1, 1\}$  and input  $x(n) = \{1, 2, 3, 3, 2, 1, -1, -2, -3, 5, 6, -1, 2, 0, 2, 1\}$  using overlap - add method assuming the length of block is 7. (10 Marks)
- b. Explain overlap-save method to find the output of the filter. (10 Marks)

### Module-3

- 5 a. Explain any three window functions to design FIR filters. (10 Marks)
- b. A lowpass filter is to be designed with the following desired frequency response

$$H_d(e^{jw}) = H_d(w) = \begin{cases} e^{-j2w}, & |w| < \frac{\pi}{4} \\ 0, & \frac{\pi}{4} \leq |w| < \pi \end{cases}$$

Determine the filter coefficients  $h_d(n)$  and  $h(n)$  if  $w(n)$  is a rectangular window defined as follows :

$$w_R(n) = \begin{cases} 1, & 0 \leq n \leq 4 \\ 0, & \text{otherwise} \end{cases}$$

Also, find the frequency response,  $H(w)$  of the resulting FIR filter. (10 Marks)

OR

- 6 a. Realize the FIR filter whose impulse response is given by  

$$h(n) = \delta(n) + \frac{1}{4}\delta(n-1) - \frac{1}{8}\delta(n-2) + \frac{1}{4}\delta(n-3) + \delta(n-4).$$
 (10 Marks)
- b. Consider a three stage FIR Lattice structure having the co-efficient  $K_1 = -0.65$ ,  $k_2 = -0.34$  and  $k_3 = 0.8$ . Realize this filter in direct form. (10 Marks)

**Module-4**

- 7 a. Compare IIR filter with FIR filter. (10 Marks)
- b. Derive an expression for the order of analog Butterworth prototype low pass filter. (10 Marks)

OR

- 8 a. Design an Buterworth filter for which gain  $K_p = 0.5$ ,  $K_s = 0.1$  and passband frequency is 2 rad/sec, stopband frequency is 10 rad/sec. (10 Marks)
- b. Draw the block diagrams of direct form – I realizations for a digital IIR filter described by the system function :

$$H(z) = \frac{8z^3 - 4z^2 + 11z - 2}{\left(z - \frac{1}{4}\right)\left(z^2 - z + \frac{1}{2}\right)}.$$
 (10 Marks)

**Module-5**

- 9 a. Discuss briefly the following DSP hardware units :  
 i) MAC unit ii) Shifter iii) Address generators. (10 Marks)
- b. Convert the following decimal numbers into Q – 15 representation :  
 i) 0.560123 ii) 0.160123. (10 Marks)

OR

- 10 a. Explain briefly the basic architecture of TMS320C54X family processor. (10 Marks)
- b. Discuss the following IEEE floating – point formats  
 i) Single precision format  
 ii) Double precision format. (10 Marks)

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# CBCS SCHEME

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18EC53

Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

## 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 amplitude modulated (AM) waves using switching modulator. (08 Marks)
- b. With a neat block diagram, explain the working of COSTAS receiver used for demodulation of DSB-SC signals. (07 Marks)
- c. An audio signal  $10 \sin 1000 \pi t$  volts is used to amplitude modulate a carrier signal  $75 \sin (2\pi \times 10^6)t$ . Assume modulation index as 0.5. Find :
- i) Side band frequencies
  - ii) Amplitude of each side band
  - iii) The bandwidth required
  - iv) The total power delivered to a load of  $100\Omega$ . (05 Marks)

OR

- 2 a. With a neat block diagram and equations, explain the generation and demodulation of VSB signals. (08 Marks)
- b. Fig.Q2(b) shows the block of an AM system with  $s(t) = AC[1 + K_a m(t)]\cos(2\pi f_c t)$  and  $|K_a m(t)| < 1$  for all  $t$ . If  $m(t)$  is a band limited signal in the interval  $(-w < f < w)$  and  $f_c > 2w$  show that  $m(t)$  can be obtained from the square rooter output.

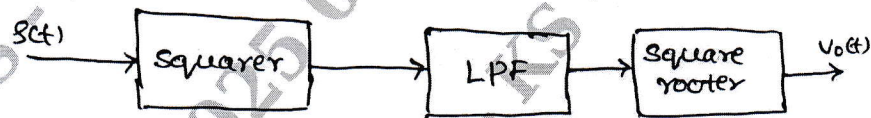


Fig.Q2(b)

- c. Explain in detail the scheme of FDM. (07 Marks) (05 Marks)

### Module-2

- 3 a. Derive the equation of FM wave and list the properties of angle modulated waves. (07 Marks)
- b. Obtain the time domain expression of NBFM wave plot its spectrum and compare with AM using phasor diagrams. (08 Marks)
- c. An angle modulated wave is defined by the equation :  
 $s(t) = 10 \cos[2\pi \times 10^6 t + 5 \sin(2000\pi)t + 10 \sin(3000\pi)t]$   
determine the following :
- i) Power in the modulated signal across a standard  $1\Omega$  resistor
  - ii) Frequency deviation
  - iii) The deviation ratio
  - iv) Phase deviation
  - v) Transmission bandwidth. (05 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8=50, will be treated as malpractice.

OR

- 4 a. With a neat block diagram and necessary equations explain the demodulation of FM waves using non-linear model of phase locked loop (PLL). (08 Marks)
- b. Draw the block diagram of super heterodyne receiver from AM reception and explain the functions of each block. (06 Marks)
- c. An FM signal  $s(t) = A_c \cos \left[ 2\pi f_c t + 2\pi k_f \int_0^t m(t) dt \right]$  is applied to a system consisting of RC high pass filter and envelope detector shown in Fig.Q4(c). Assume  $R \ll X_C$  and envelope detector does not load the filter, determine the envelope detector output assuming  $k_f |m(t)| < f_c$  for all  $t$ . Comment on the output.

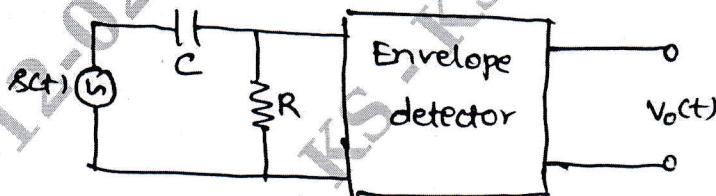


Fig.Q4(c)

(06 Marks)

Module-3

- 5 a. Explain thermal noise and white noise. (06 Marks)
- b. Define noise equivalent bandwidth and derive the expression for the same. (08 Marks)
- c. An amplifier operating over a frequency range of 450 to 460 KHz is having an input resistance of  $10\text{ K}\Omega$ . If the temperature is  $15^\circ\text{C}$ . Find :
- rms noise voltage at the input of the amplifier
  - the amplifier noise power
  - the power spectral density.

(06 Marks)

OR

- 6 a. Starting from fundamentals, derive the expression for Figure of Merit (FOM) of an AM receiver operating on single tone modulation. (10 Marks)
- b. Discuss the noise in FM receivers and obtain the expression for Figure of Merit (FOM) for FM receiver. (10 Marks)

Module-4

- 7 a. Mention the advantages of digitalizing analog signals. (04 Marks)
- b. With relevant equations, state and explain sampling theorem for low pass signals and derive the interpolation formula. (10 Marks)
- c. With a neat block diagram, explain the generation of Pulse Position Modulation (PPM) signals. (06 Marks)

OR

- 8 a. Mention the few applications of pulse amplitude modulation (PAM). (04 Marks)
- b. Consider the signal  $x(t) = 5\cos(2000\pi t) + 10\cos(6000\pi t)$
- What is the Nyquist rate and Nyquist interval
  - Assume if the signal is sampled at frequency  $f_s = 5000\text{ Hz}$  ; what is the resulting signal
  - Draw the spectrum of the sampled signal for  $f_s = 5000\text{ Hz}$ . (10 Marks)
- c. With a neat block diagram, explain Time Division Multiplexing Technique(TDM). (06 Marks)



**Module-5**

- 9 a. A PCM system uses uniform quantizer followed by a N bit encoder. Show that rms signal to quantization noise is approximately given by  $[SNR]_{dB} = (4.8 + 6N)dB$ . (08 Marks)
- b. Explain the generation and reconstruction of PCM signal. (06 Marks)
- c. A TV Signal with a bandwidth of 4.2MHz is transmitted using binary PCM. The number of representation levels are 512 calculate :  
i) Code word length  
ii) Final bit rate  
iii) Transmission band width. (06 Marks)

**OR**

- 10 a. For the bit sequence 10011101 draw unipolar NRZ, polar NRZ, unipolar RZ, bipolar RZ and Manchester encoding formats. (08 Marks)
- b. Explain Delta modulation with relevant equations and waveforms. (06 Marks)
- c. With a neat block diagram, explain the working of linear predictive vocoder. (06 Marks)

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## Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

### 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. Discuss the reasons for using logarithmic measure of measuring the amount of information. (06 Marks)
- b. A source transmits two independent messages with probabilities of  $p$  and  $(1-p)$  respectively. Prove that the entropy is maximum when both the messages are equally likely. Plot the variations of entropy ( $H$ ) as a function of probability ' $p$ ' of the messages. (04 Marks)
- c. Find  $G_1$  and  $G_2$  and verify that  $G_1 > G_2 > H(s)$  for the Fig.Q1(c). (10 Marks)

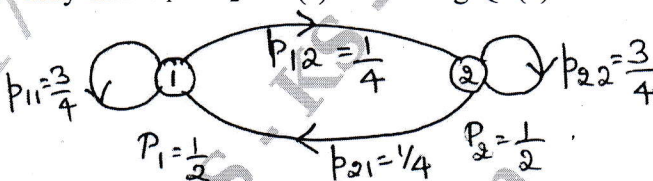


Fig.Q1(c)

OR

- 2 a. Define the following with respect to information theory : (06 Marks)
  - i) Self information
  - ii) Entropy
  - iii) Rate of information.
- b. An analog signal is band limited to 500 Hz and is sampled at "Nyquist rate". The samples are quantized into 4 levels and each level represent one message. The quantization levels are assumed to be independent. The probabilities of occurrence of 4 levels are  $P_1 = P_4 = \frac{1}{8}$  and  $P_2 = P_3 = \frac{3}{8}$  find the information rate of the source. (04 Marks)
- c. The state diagram of the Mark off source is as shown in the Fig.Q2(c). Find : (10 Marks)
  - i) The entropy of each state  $H_i$
  - ii) The entropy of source  $H$
  - iii)  $G_1$ ,  $G_2$  and  $H(G_1 > G_2 > H)$ .

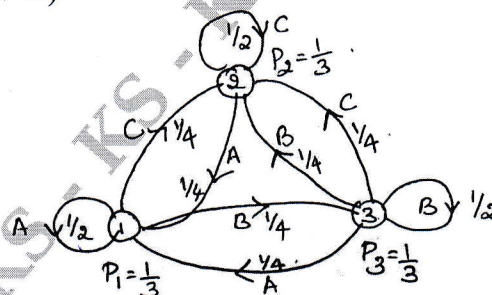


Fig.Q2(c)

#### Module-2

- 3 a. A DMS has an alphabet  $S = \{s_0, s_1, s_2, s_3, s_4, s_5, s_6\}$  and source statistics  $P = \{0.125, 0.0625, 0.25, 0.0625, 0.125, 0.125, 0.25\}$ . Construct binary Huffman code. Also find the efficiency and redundancy of coding. (10 Marks)
- b. Explain prefix coding with an example. Also explain the properties of prefix codes. (10 Marks)



OR

- 4 a. Explain Shannon's encoding algorithm. State the properties of Shannon's encoding algorithm. (10 Marks)
- b. Apply Shannon – Fano encoding algorithm to the following set of messages and obtain the entropy and efficiency.

Message	m <sub>1</sub>	m <sub>2</sub>	m <sub>3</sub>	m <sub>4</sub>	m <sub>5</sub>	m <sub>6</sub>	m <sub>7</sub>	m <sub>8</sub>
Probability of message	$\frac{16}{32}$	$\frac{4}{32}$	$\frac{4}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{2}{32}$	$\frac{1}{32}$	$\frac{1}{32}$

(10 Marks)

**Module-3**

- 5 a. Prove that the mutual information of the channel is symmetric i.e.  $I(X;Y) = (Y;X)$ . (08 Marks)
- b. Two noisy channels are cascaded whose channel matrices are given by,

$$p(y_j | x_i) = \begin{bmatrix} \frac{1}{4} & \frac{1}{2} & \frac{1}{4} \\ \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \end{bmatrix} \text{ and } p(z_j | y_i) = \begin{bmatrix} \frac{1}{3} & \frac{2}{3} & 0 \\ \frac{2}{3} & 0 & \frac{1}{3} \\ 0 & \frac{1}{3} & \frac{2}{3} \end{bmatrix}$$

With  $P(x_1) = P(x_2) = 0.5$ . Show that  $I(X; Y) > I(X; Z)$ .

(12 Marks)

OR

- 6 a. State channel capacity theorem : In the channel capacity equation when the signal power is fixed and white Gaussian noise is present, the channel capacity approaches an upper limit with increase in band width 'B'. Prove that this upper limit is given as,

$$C_{\infty} = \lim_{B \rightarrow \infty} C = 1.44 \frac{S}{N_0}$$

(10 Marks)

- b. For the channel shown in Fig.Q6(b) the symbols are transmitted at the rate of 10,000 per second. Calculate maximum mutual information of this channel. (10 Marks)

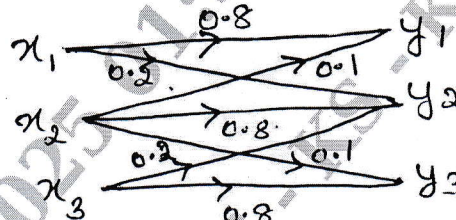


Fig.Q6(b)

**Module-4**

- 7 a. Consider a (7, 4) linear code whose generator matrix is G

$$G = \left[ \begin{array}{cccc|cccc} 1 & 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 0 & 1 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 1 & 1 \end{array} \right]$$

Find :

- All the code vectors of this code
  - Parity check matrix of this code
  - The maximum weight of this code.
- (10 Marks)
- b. The generator polynomial for a (15, 7) cyclic code is  $G(x) = 1 + x^4 + x^6 + x^7 + x^8$ .
- Find the code vector in systematic form for the message  $D(x) = x^2 + x^3 + x^4$
  - Assume that the first and last bit of the code vector  $V(x)$  for  $D(x) = x^2 + x^3 + x^4$  suffer transmission errors. Find the syndrome of  $V(x)$ .
- (10 Marks)

OR

- 8 a. For a(5, 2) linear, systematic block code, choose the generator matrix and parity check matrix with the objective of maximizing  $d_{\min}$ . For the matrix chosen, construct the standard array. (10 Marks)

- b. Consider a(6, 3) linear block code whose

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

- Find all the code vector
- Find all Hamming weight and distance
- Find minimum weight parity check matrix
- Draw encoder circuit for above code.

(10 Marks)

**Module-5**

- 9 a. Consider (3, 1, 2) convolution encoder with impulse response

$$g_1^{(1)} = \{1 \ 1 \ 0\}, \quad g_1^{(2)} = \{1 \ 0 \ 1\}, \quad g_1^{(3)} = \{1 \ 1 \ 1\}$$

- Draw the encoder block diagram
- Find the generator matrix and output code vector for  $m = \{1 \ 1 \ 1 \ 0 \ 1\}$ .
- Find the code vector corresponding to the message sequence using time domain approach.

(12 Marks)

- b. Write a note on Viterbi algorithm for decoding of convolutional codes. (08 Marks)

OR

- 10 a. For the convolutional encoder of Fig.Q10(a) determine the following :

- Dimension of the code
- Code rate
- Constraint length
- Generating sequences (impulse responses)
- Output sequence for message sequence of  $m = \{1 \ 0 \ 0 \ 1 \ 1\}$  using transfer domain approach.

(08 Marks)

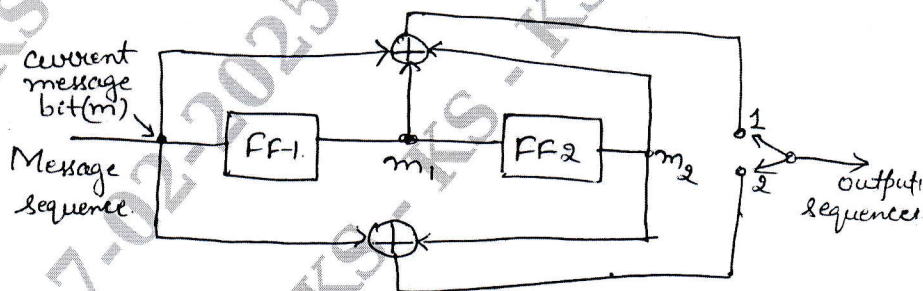


Fig.Q10(a)

- b. A rate 1/3 convolution encoder has generating vectors as :

$$g_1 = (1 \ 0 \ 0), \quad g_2 = (1 \ 1 \ 1), \quad g_3 = (1 \ 0 \ 1)$$

- Sketch the encoder configuration
- State diagram and code tree
- If input message sequence is 10110, determine the output sequence of the encoder using code tree.

(12 Marks)

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18EC55

## Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025 Electromagnetic Wave

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 in vector form. (10 Marks)  
b. If  $\vec{D} = xy^2z^2 \vec{a}_x + x^2yz^2 \vec{a}_y + x^2y^2z \vec{a}_z$  C/m<sup>2</sup> find i) an expression for  $\rho_v$  ii) the total change within the cube defined by  $0 \leq x \leq 2$ ;  $0 \leq y \leq 2$ ;  $0 \leq z \leq 2$ . (10 Marks)

OR

- 2 a. Obtain an expression for electric field intensity due to infinite line charge. (10 Marks)  
b. Define the following terms in electric field density i) Line charge ii) Surface charge iii) volume charge. (10 Marks)

### Module-2

- 3 a. State and prove Gauss law for point charge. (05 Marks)  
b. State and prove divergence theorem. (05 Marks)  
c. Give the electrical tube density  $\vec{D} = 0.3r^2 \vec{a}_r$  nC/m<sup>2</sup> in free space.  
i) Find E at Pt. P( $r = 2$ ;  $\theta = 25^\circ$ ;  $\phi = 90^\circ$ ).  
ii) Find the total change within the sphere  $r = 3$ .  
iii) Find the total electric flux leaving the sphere  $r = 4$ . (10 Marks)

OR

- 4 a. Obtain an expression for integral form of work done in moving a Pt. Charge Q from one position to another position. (08 Marks)  
b. Calculate the work done in moving a 4C charge from B(1, 0, 0) to A(0, 2, 0) along the path  $y = 2 - 2x$ ,  $z = 0$  in the field  $\vec{E} = (1) 5 \vec{a}_x$  V/M (2)  $5x \vec{a}_x$  V/m (06 Marks)  
c. A 15 nC point charges  $\rho_s$  at the origin in free space. Calculate  $V_1$  if point P is located at P(-2, 3, -1) and  $V = 0$  at (6, 5, 4). (06 Marks)

### Module-3

- 5 a. Drive the Poisson's and Laplaces equations. (08 Marks)  
b. State the prove the Stoke's theorem. (06 Marks)  
c. Let  $V = 2xy^2z^3$  and  $\vec{E} = E_0$  given point P(1, 2, -1). Calculate i) V at P ii) E at P iii)  $\rho_v$  at P. (06 Marks)

OR

- 6 a. State and prove the Amperes circuital law. (06 Marks)  
b. Drive the expression for vector magnetic potential. (06 Marks)  
c. A current element  $I d\vec{L} = 10^{-3}(2 \vec{a}_x + 4 \vec{a}_y - \vec{a}_z)$  A/m located at A(-5, 3, -2) produces a field  $d\vec{H}$  at B(3, -4, 3) i) Give a unit vector in the direction at  $d\vec{H}$  at B ii) Find  $d(H)$  at B. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-4**

- 7 a. Derive an expression for the Force between differential current elements in magnetic field. (06 Marks)
- b. The field  $B = -2\bar{a}_x + 3\bar{a}_y + 4\bar{a}_z$  mT is present in free space. Find the vector force exerted on a st. wire carrying 12A current in the  $a_{AB}$  direction given A(1, 1, 1) and B(2, 1, 1). (08 Marks)
- c. An air core toroid has 500 turns mean radius of 15 cm cross sectional area of  $6 \text{ cm}^2$ . The magnetic motive force is 2000 AT. Calculate total reluctance flux, flux density, field intensity inside the core. (06 Marks)

**OR**

- 8 a. Write note on forces on magnetic materials. (10 Marks)
- b. Write a note on magnetic circuits. (10 Marks)

**Module-5**

- 9 a. Drive the expression for a stationary closed path in a time varying field statically induced EMF. (06 Marks)
- b. State Maxwell's equation in both point form and in integral form. (06 Marks)
- c. Find the frequency at which conduction current density and displacement current density are equal in a medium with  $\sigma = 2 \times 10^{-4}$  and  $\epsilon_r = 81$ . (08 Marks)

**OR**

- 10 a. State and explain poynting theorem. (08 Marks)
- b. Define the following terms in uniform plane wave i) phase velocity ii) Intrinsic impedance iii) wave length. (06 Marks)
- c. The depth at penetration in a certain conducting medium is 0.1 m and the frequency of the electromagnetic wave is 1.0 MHz. Find the conductivity of the conducting medium. (06 Marks)

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18EC56

## Fifth Semester B.E. Degree Examination, Dec.2024/Jan.2025

### 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 the typical design flow for designing VLSI IC circuits, with a neat flow chart. (10 Marks)
- b. Explain the different levels of abstraction used for programming in verilog and write the example in each case. (10 Marks)

OR

- 2 a. Explain top-down design methodology and bottom-up design methodology with example. (10 Marks)
- b. Explain the design hierarchy using 4-bit ripple carry counter. With a block diagram of 4-bit ripple carry counter, explain the design hierarchy. (10 Marks)

#### Module-2

- 3 a. Explain the lexical convention 'sized numbers and unsized numbers'. (02 Marks)
- b. Explain the following data types with an example in verilog:  
i) Registers ii) Nets iii) Arrays iv) Integers v) Time. (10 Marks)
- c. What are system tasks and compiler directives? Explain with example. (08 Marks)

OR

- 4 a. With a neat block diagram, explain the components of a verilog module by highlighting mandatory blocks. (08 Marks)
- b. What are the components of SR-Latch? Write verilog HDL module of SR-Latch. (08 Marks)
- c. Write ANSI C style port declaration syntax. (04 Marks)

#### Module-3

- 5 a. With the help of logic diagram, write a verilog code for 4 to 1 multiplexer using gate-level modeling. (08 Marks)
- b. What are rise, fall and turn-off delays? Explain, how they are specified in verilog. (08 Marks)
- c. Design gate-level description for 2-to-1 multiplexer using bufif 0 and bufif 1 gates. The delay specification for these gates are as follows:

Delay	Min	Typ	Max
Rise	1	2	3
Fall	3	4	5
Turn-off	5	6	7

(04 Marks)

OR

- 6 a. Write a verilog data-flow level of abstraction for 4-to-1 multiplexer using i) Conditional operator ii) Logical equation. (10 Marks)

- b. What would be output of the following:

$a = 8'b10100101$        $b = 8'b10110111$

- i)  $a \& b$       ii)  $a \& \& b$       iii)  $\& b$       iv)  $a \gg 1$       v)  $a \gg \gg 1$       vi)  $y = \{2\{b\}\}$   
 vii)  $a \wedge b$       viii)  $z = \{b, a\}$       ix)  $y = a + b$       x)  $!a$       (10 Marks)

#### Module-4

- 7 a. Explain the blocking assignment statements and non-blocking assignment statements with relevant examples. (08 Marks)  
 b. Explain the following control statement syntax with an example:  
 i) if-else      ii) For (08 Marks)  
 c. Write a verilog HDL code for JK-flip flop using CASE statement. (04 Marks)

#### OR

- 8 a. Bring out the difference between task and function. (08 Marks)  
 b. Write verilog program to define a function to calculate the factorial of a 4-bit number. The output is a 32-bit value. Invoke the function by using stimulus and check results. (08 Marks)  
 c. What is task definition using ANSI c-style argument declaration? (04 Marks)

#### Module-5

- 9 a. Explain the terms force and release. (06 Marks)  
 b. Discuss the system tasks related to files. (06 Marks)  
 c. Using assign and deassign statements, design a positive edge-triggered D-flipflop with a synchronous clear ( $q = 0$ ) and preset ( $q = 1$ ). (08 Marks)

#### OR

- 10 a. With a neat flow chart explain basic computer-aided logic synthesis process. (10 Marks)  
 b. What will the following statement translate to when run on a logic synthesis tool:  
 i)  $\text{assign } (c\_out, sum) = a + b + c\_in;$   
 ii)  $\text{assign out} = (s) ? i1 : i0;$   
 iii)  $\text{always } @ (clk \text{ or } d)$   
     if (clk)  
      $q = d;$  (10 Marks)

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# CBCS SCHEME

18CIV59

USN

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Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025

## Environmental Studies

(COMMON TO ALL BRANCHES)

Time: 2 hrs.]

[Max. Marks: 100

### INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **hundred** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. The ecology is defined as the study of
    - a) Relation between organisms to their environment
    - b) Relation between group of organisms to their environment
    - c) Both (a) and (b)
    - d) None
  2. Concentration of pollutants in successive tropic levels is known as
    - a) Bio-magnification
    - b) Bio-remediation
    - c) Bio-accumulation
    - d) All of these
  3. Physical environment includes
    - a) Hydrosphere
    - b) Lithosphere
    - c) Atmosphere
    - d) All of these
  4. World environment day is celebrated on
    - a) April 22<sup>nd</sup>
    - b) July 22<sup>nd</sup>
    - c) June 5<sup>th</sup>
    - d) Aug 22<sup>nd</sup>
  5. Forest rich area in Karnataka is found in
    - a) Bandipura
    - b) Nagarhole
    - c) Westernghat's
    - d) Mangalore
  6. Phytoplankton as an aquatic system can be considered as
    - a) Micro consumer
    - b) Consumer
    - c) Producer
    - d) Organism
  7. World Food Summit (1996) is pledged to reduce the number of hungry people to
    - a) 500 million
    - b) 400 million
    - c) 250 million
    - d) 100 million
  8. Organic farming is a farming without using
    - a) Synthetic fertilizers
    - b) Pesticides
    - c) Green manures
    - d) Both (a) and (b)

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22. Which of the following is not a world heritage site  
a) Manas World life sanctuary  
b) Nanda Devi National park  
c) Kaziranga National park  
d) Periyar National park
23. EIA can be expanded as  
a) Environmental and Industrial Act  
b) Environmental Impact Act Activities  
c) Environmental Impact Assessment  
d) Environmentally important Activity
24. Where is the largest wind farm located in India?  
a) Tuticorin in Tamil Nadu  
b) Jaisalmar wind park Rajasthan  
c) Vaspert Wind form Maharashtra  
d) Chakala Wind form Maharashtra
25. How is OTEC caused  
a) By wind energy  
b) By geothermal energy  
c) By solar energy  
d) By gravitational energy
26. Which country has world's largest tidal power plant  
a) Netherlands                      b) South Korea                      c) Laus                      d) Bolivia
27. What does OTEC stands for  
a) Ocean thermal energy conversion  
b) Ocean thermal energy conservation  
c) Ocean thermal energy cultivation  
d) Ocean thermal energy consumption
28. Solar energy is as ideal energy source because of  
a) Unlimited supply  
b) No air and water pollution  
c) No hazardous products  
d) All of these
29. Why is it important to save energy in our daily lifers?  
a) We need to burn more fossil fuels  
b) So that other people can waste energy  
c) We save electricity because it is easier to see in the dark  
d) We need to protect our environment for the future
30. Wind energy generation depends on  
a) Direction of wind                      b) Humidity  
c) Velocity of wind                      d) All of these
31. The only disadvantage of hydrogen energy source is  
a) Releases toxic products  
b) Causes air and water pollution  
c) Hazards effect due to risk of leakage  
d) It takes more energy to produce hydrogen than the energy that could be obtained from it

32. What percent of the Sun's energy is absorbed by the earth?  
a) 50%                      b) 0%                      c) 40%                      d) 10%
33. Bhopal gas disaster is a kind of  
a) Natural disaster                      b) Man-made disaster  
c) Water leakage                      d) None of these
34. Who is known as father of modern seismology  
a) Charles Richter                      b) R.D. Oldham                      c) W.M. Davis                      d) None of these
35. Volcanic erupted material when inside the hill or earth or mountain is called  
a) Lava                      b) Magma                      c) Lahars                      d) None of these
36. Generally the number on Richter scale ranges  
a) 0 to 9                      b) 1 to 5                      c) 1 to 12                      d) 0 to 6
37. Disaster management includes  
a) Mitigation                      b) Reconstruction                      c) Rehabilitation                      d) All of these
38. In India national institute of disaster management is located at  
a) Manipur                      b) Punjab                      c) Delhi                      d) Hyderabad
39. A disease that become usually wide-spread and even global in its reach is referred to as  
a) Pandemic                      b) Epidemic                      c) Spanish flue                      d) Hyper endemic
40. Goal of the cloud seeding is to  
a) Enhance precipitation                      b) Suppress hail  
c) Dissipate fog                      d) All of these
41. The scientist who experimented cloud seeding first time  
a) Isaac Newton                      b) Rutherford                      c) Vincent. J.                      d) C.V. Raman
42. Carbon trading deals  
a) Carbon emissions                      b) Sulphur dioxide emissions  
c) Acid rain                      d) None of these
43. Chemicals used for cloud seeding is  
a) Dry ice                      b) Silver dioxide  
c) Potassium dioxide                      d) All of these
44. One can reduce carbon foot print at lunch by  
a) Don't eat food  
b) Eat fast food  
c) Eat lots of packaged things like lunchables  
d) Buying food grown by locally and organically
45. The sources of hydrogen are  
a) Biomass                      b) Coal                      c) Water                      d) All of these
46. Which of the following is a secondary air pollutant?  
a) Carbon monoxide                      b) Ozone                      c) Sulphur dioxide                      d) Carbon dioxide
47. SMOG is  
a) Natural phenomenon                      b) Colourless  
c) Combination of smokes and fog                      d) All of these



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62. The color code of plastic bags for disposing of microbial laboratory culture waste is  
 a) Black                      b) Red                      c) Blue                      d) White
63. Which vaccination should be given to workers who deal with biomedical waste  
 a) Hbs Ag                      b) Tetanus                      c) Rabies                      d) Both (a) and (b)
64. Which of the following is the hazardous pollutant released from batteries  
 a) Cadmium                      b) Barium                      c) Cobalt                      d) Arsenic
65. Which country produces the most e-waste per year?  
 a) India                      b) China                      c) France                      d) USA
66. Which of the following element make e-waste hazardous in nature  
 a) Glass                      b) Lead                      c) Plastic                      d) Iron
67. Acid rain is caused by emissions of  
 a) Sulphur dioxide                      b) Nitrogen oxide                      c) Both (a) and (b)                      d) Carbon dioxide
68. Sulphur dioxide is produced by  
 a) Lightning strikes                      b) Volcanic eruptions  
 c) Gasoline engine                      d) All are correct
69. The international protocol to protect the ozone layer is  
 a) The Montreal protocol                      b) Vienna protocol  
 c) Kyoto protocol                      d) Cartagena protocol
70. Ozone layer thickness measured in  
 a) Millimeter                      b) Centimeters                      c) Decibels                      d) Dobson units
71. People who are exposed to radon in drinking water may have risk of getting  
 a) Typhoid                      b) Cholera                      c) Cancer                      d) Blue baby syndrome
72. The radon concentrations in soil samples is measured by using  
 a) IR-Spectroscopy                      b)  $\gamma$ -Spectroscopy                      c) uv-Spectroscopy                      d) All of these
73. Maximum permissible concentration of fluoride in drinking water is  
 a) 1.5 mg/L                      b) 1.25 mg/L                      c) 1.0 mg/L                      d) 2.0 mg/L
74. Dental fluorosis can begin at levels over  
 a) 1.7 ppm                      b) 4 ppm                      c) 8 ppm                      d) 2 ppm
75. Excess fluoride in drinking water causes  
 a) Blue babies                      b) Fluorosis                      c) Taste and odour                      d) Intestinal irritation
76. Major source of fluoride is  
 a) River water                      b) Tooth paste                      c) Ground water                      d) Food products
77. The Kyoto protocol is  
 a) The response to treat the climate change  
 b) To reduce the emission of green house gases  
 c) a and b  
 d) To give permission to emit green house gases
78. The primary source of green house gases is  
 a) Wind                      b) Fossil fuel                      c) Water                      d) Green plants



79. The Kyoto protocol was adopted at the  
a) Third conference of UNFCCC in 1997  
b) Convention on the transboundary effects of industrial accidents  
c) United nations frame work convention on climate change in 1992  
d) Convention on biological diversity
80. Ecotoxicology is the study of  
a) Chemical interaction of organism and environment  
b) Physical interaction of organism and environment  
c) Thermal interaction of organism and environment  
d) Biological interaction of organism and environment
81. Hazard estimation in eco-toxicology is done based on  
a) Accumulation  
b) Bio-accumulation  
c) SARA  
d) HWL
82. Eco-toxicology is based on  
a) Physical characteristics of chemicals  
b) Biological characteristics of chemicals  
c) Toxicological characteristics of chemicals  
d) All are correct
83. Green house effect causes  
a) Rise in temperature of the earth  
b) Increase in rain fall  
c) Lowering in acid rain  
d) Lowering in temperature of the earth
84. The effects of acid rain is  
a) Skin cancer  
b) Reduces soil fertility  
c) Increases atmospheric temperature  
d) Causing respiratory problem
85. Global warming could affect  
a) Climate  
b) Increase in sea level  
c) Melting of glaciers  
d) All of these
86. Ground water is recharged naturally by  
a) Rain  
b) Snow melt  
c) Rivers and lakes  
d) All of these
87. Major compound responsible for the destruction of the stratospheric ozone layer is  
a) Oxygen  
b) CFC  
c) Methane  
d) Carbon dioxide
88. Remote sensor detects  
a) Electro magnetic radiation  
b) Only IR radiations  
c) Only uv radiations  
d) Only visible radiations
89. Indian remote sensing satellite Cartosat has been launched to monitor  
a) Spot images  
b) Cartographic applications  
c) Both (a) and (b)  
d) Atmospheric

90. Remote sensing is a  
 a) Sensor system  
 b) Satellite system  
 c) Ground segment  
 d) All of these
91. GIS stands for  
 a) Generic information system  
 b) Geological information system  
 c) Geographic information Sharing  
 d) Geographic Information system
92. GIS does not monitor  
 a) Deforestation  
 b) Ozone layer depletion  
 c) Land covers  
 d) None of these
93. GIS mainly deals with  
 a) Satellite images  
 b) Land sat images  
 c) Both (a) and (b)  
 d) None of these
94. What is the full form of NGO's?  
 a) Non Governmental Organization  
 b) Null Governmental Organization  
 c) Nice Governmental Organization  
 d) None of these
95. What is the role of NGOs in natural resource management?  
 a) Creating awareness among the public on current environmental issues and solution  
 b) Being involved in the protection of human rights to a clean environment  
 c) Data generation on natural resources timeline and history  
 d) Making profit from government
96. The instrument which records earth quake wave is called  
 a) Sesimograph  
 b) Chimograph  
 c) Hythergraph  
 d) None of these
97. In which year the current revision of ISO 14001 get published  
 a) 2010  
 b) 2011  
 c) 2015  
 d) 2016
98. Which of the following pair of ISO 14000 standards fall under the category of environmental management system?  
 a) ISO 14001 and ISO 014004  
 b) ISO 14010 and ISO14001  
 c) ISO 14011 and ISO 14001  
 d) ISO 14011 and ISO 14004
99. Centre for science and environment is  
 a) Government organization  
 b) International body  
 c) Non government organization  
 d) None of these
100. Which of the following is NGO?  
 a) Narmada Bachao Andolan  
 b) CPCB  
 c) KSPCB  
 d) None of these