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18ES51

Fifth Semester B.E. Degree Examination, July/August 2021
Technological Innovation Management and Entrepreneurship

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Define Management. List and explain the essential management functions. (08 Marks)
  b. Explain the various roles of a Manager. (07 Marks)
  c. Compare 'management' with administration. (05 Marks)

2 a. With a neat diagram, explain the hierarchy of organizational plans. (08 Marks)
  b. Explain the various steps involved in rational decision making with a neat diagram. (08 Marks)
  c. Explain any five limitations of planning. (04 Marks)

3 a. Explain about the purpose of organization and the process of organizing. (10 Marks)
  b. What is recruitment? Explain the steps in the selection process. (10 Marks)

4 a. Explain Maslow's need hierarchy theory with a neat diagram. (10 Marks)
  b. Define leadership. Explain briefly about any two leadership styles. (10 Marks)

5 a. Describe the social responsibilities of business towards different groups in a society. (10 Marks)
  b. What is Social Audit? List its benefit and limitations. (10 Marks)

6 a. Define Entrepreneurship. Explain the characteristics of an Entrepreneur. (10 Marks)
  b. Briefly explain the various classifications of Entrepreneurs. (10 Marks)

7 a. Briefly explain the importance of the family business and the different stages of development of a family business. (10 Marks)
  b. Discuss the contribution made by Indian family business with examples. (10 Marks)

8 a. Explain the various ways to generate business ideas, and briefly describe how to identify a Business opportunity. (10 Marks)
  b. Briefly explain about Marketing and financial feasibility analysis. (10 Marks)

9 a. List and explain the contents of a Business plans. (08 Marks)
  b. Why do some Business plans fails? Explain. (04 Marks)
  c. Define Venture Capital. List out the stages of venture capital financing. (08 Marks)

10 a. Explain the importance of Network analysis during project execution. (08 Marks)
   b. Discuss the steps in CPM network analysis techniques, with its advantages and limitations. (08 Marks)
   c. Compare PERT with CPM. (04 Marks)

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18EC52

Fifth Semester B.E. Degree Examination, July/August 2021
Digital Signal Processing

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1   a.   Describe the process of frequency domain sampling and reconstruction of discrete time signal. **(08 Marks)**
    b.   Find the 4-point DFT of the sequence $x(n) = \{1, 2, 0, 1\}$ using matrix method. **(04 Marks)**
    c.   Using graphical method (concentric method) obtain 5 point circular convolution of two DFT signal defined as,
$$x(n) = (1.5)^n; \quad 0 \le n \le 2$$
$$y(n) = (2n - 3); \quad 0 \le n \le 3$$
(08 Marks)

2   a.   Compute the 4-point DFT of the given sequence $x(n) = \{0, 1, 2, 3\}$ and verify the result with IDFT method using formula method. **(08 Marks)**
    b.   Compute the N-point DF of the sequence $x(n) = a^n; \quad 0 \le n \le N-1$. **(04 Marks)**
    c.   State and prove the following properties :
         (i)   Circular time shift of a sequence.
         (ii) Parseval's theorem. **(08 Marks)**

3   a.   Consider a FIR filter with impulse response $h(n) = \{3, 2, 1, 1\}$, if the I/P
$x(n) = \{1, 2, 3, 3, 2, 1, -1, -2, -3, 5, 6, -1, 2, 0, 2, 1\}$
find the output. Use overlap save method assuming the length of the block is 9. **(10 Marks)**
    b.   Find the 8 point DFT of the sequence $x(n) = \{1, 1, 1, 1, 0, 0, 0, 0\}$ using DIT – FFT radix – 2 algorithm and draw the signal flow graph. **(10 Marks)**

4   a.   Consider a FIR filter with impulse response $h(n) = \{1, 2\}$ and input sequence $x(n) = \{1, 4, 3, 0, 7, 4, -7, -7, -1, 3, 4, 3\}$. Compute $y(n)$ using overlap add technique assuming the length of the block is 5. **(10 Marks)**
    b.   Derive the computational arrangement of 8-point DFT using Radix-2 DIF-FFT algorithm and draw the signal flow diagram. **(10 Marks)**

5   a.   Design a symmetric FIR low pass filter whose designed frequency is given by,
$$H_d(\omega) = \begin{cases} e^{-j\omega\tau}; & |\omega| \le \omega_C \\ 0 & ; \text{ otherwise} \end{cases}.$$
The length of the filter should be 7 and cut off frequency is 1 rad/sec use rectangular window. **(08 Marks)**
    b.   Determine the direct form realization of the following system function:
$$H(z) = 1 + 2z^{-1} - 3z^{-2} + 5z^{-4} - 4z^{-3}.$$
(06 Marks)
    c.   List the advantages and disadvantages of FIR filters. **(06 Marks)**

6 a. Draw the magnitude response and show the biggest side lobe values for the following windows:
   (i)   Rectangular window.   (ii)   Hanning window.
   (iii) Hamming window.   (iv)   Bartlett window   **(04 Marks)**

b. The desired frequency response of a low pass filter is given by,

$$H_d(e^{j\omega}) = H_d(\omega) = \begin{cases} e^{-j3\omega} ; & |\omega| < \dfrac{3\pi}{4} \\ 0 & ; \dfrac{3\pi}{4} < |\omega| < \pi \end{cases}$$. Determine the frequency response of the FIR filter

if Hamming window is used with N = 7.   **(08 Marks)**

c. Consider an FIR lattice filter with coefficients $K_1 = 0.65$, $K_2 = -0.34$, $K_3 = 0.8$, find its impulse response. Draw the equivalent direct form structure.   **(08 Marks)**

7 a. Draw the frequency response curve and write the transformation to convert the analog lowpass prototype into practical analog low pass, high pass, band pass and band stop filters with specified frequency.   **(08 Marks)**

b. Realize the following digital filter using a direct form II structure

$$H(z) = \frac{1 + 0.4z^{-1}}{1 - 0.5z^{-1} + 0.06z^{-2}} .$$ **(04 Marks)**

c. Assuming that T = 2 sec in BLT and given the following points:
   (i) $S = -1 + j$, on the left half of the S-plane.
   (ii) $S = 1 - j$, on the right half of the S-plane.
   (iii) $S = j$, on the positive jw on the S-plane.
   (iv) $S = -j$ on the negative jw on the S-plane.

Convert each of these points in the S-plane to the Z-plane and verify the mapping properties.   **(08 Marks)**

8 a. Draw and discuss flow chart for IIR filter design using Bilinear transformation.   **(04 Marks)**

b. An analog filter is given by,

$$H_a(s) = \frac{3}{(s + 3)(s + 1)} ,$$

with T = 1 sec. Obtain H(z) using Bilinear transformation.   **(08 Marks)**

c. Draw the Direct form – I and Direct form – II structure for the system given by,

$$H(z) = \frac{z^{-1} - 3z^{-2}}{(10 - z^{-1})(1 + 0.5z^{-1} + 0.5z^{-2})}$$ **(08 Marks)**

9 a. Explain Digital Signal processors using Harvard architecture.   **(08 Marks)**

b. Convert the following number in the IEE single precision format to the decimal format:
   (i)   110000000.010......0000
   (ii)   010000000000.......0000   **(04 Marks)**

c. Explain Fixed-point digital signal processes using basic architecture of TMS320C54X family.   **(08 Marks)**

10 a. Explain the following Digital Signal processor hardware units:
   (i)   Multiplier and Accumulator
   (ii)   Shifters
   (iii) Address Generators.   **(09 Marks)**

b. Discuss IEEE Double Precision format.   **(07 Marks)**

c. Convert the following Q-15 signed numbers into the Decimal number :
   (i)   1110101110000010
   (ii)   0100011110110010   **(04 Marks)**

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Fifth Semester B.E. Degree Examination, July/August 2021
Principles of Communication Systems

Time: 3 hrs.

Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Explain in detail, the working of switching modulator with suitable block diagram and necessary derivations. **(08 Marks)**

   b. Using the message signal $M(t) = \dfrac{1}{(1+t^2)}$. Determine and sketch the modulated wave for amplitude modulation with the following values : i) $\mu = 50\%$ ii) $\mu = 100\%$. **(06 Marks)**

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

2 a. Derive an equation for SSB modulated wave for which upper sideband is retained. **(07 Marks)**

   b. Explain how Costas receiver is used for demodulating DSB – SL signal. **(07 Marks)**

   c. With relevant block diagram, explain the working of FDM transmitter and receiver. **(06 Marks)**

3 a. Derive the equation of frequency modulated wave. Define :
      i) Modulation index
      ii) Maximum deviation of frequency modulated single. **(06 Marks)**

   b. With neat circuit diagram, explain FM demodulation using balanced slope detector. **(07 Marks)**

   c. With a neat block diagram, explain the concept of super hetero dyne receiver. **(07 Marks)**

4 a. With relevant diagram, explain direct method generation of FM using Hartley oscillator and how frequency stability is achieved. **(08 Marks)**

   b. When a 50.4MHz carrier is frequency modulated by a sinusoidal AF modulating signal. The highest frequency reached is 50.405MHz. Calculate :
      i) Frequency deviation produced
      ii) Carrier swing of the wave
      iii) Lowest frequency reached. **(06 Marks)**

   c. Explain the linear model of PLL using relevant diagram and suitable expressions. **(06 Marks)**

5 a. Explain shot noise and thermal noise with relevant diagrams and expressions. **(06 Marks)**

   b. Show that the figure of merit for DSBSC system is unity using suitable expressions. **(08 Marks)**

   c. Why Preemphasis and Deemphasis are required. Explain how they are implemented. **(06 Marks)**

6 a. What is White Noise? Explain the power spectral density and auto correlation function. **(07 Marks)**

   b. The average noise per unit BW measured at the front end of the AM receiver is 10^{-3}W/Hz. The modulated wave is sinusoidal with a carrier power of 80KW and side band power of 10KW per side band. The message band width is 4KHz. Determine the SNR_0 of the system and FOM(Figure of Merit). **(06 Marks)**

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

7	a.	What are the advantages of digital signal over analog signal?	(04 Marks)
	b.	State and prove sampling theorem for band limited signals.	(08 Marks)
	c.	With neat block diagram, explain the generation of PPM waves.	(08 Marks)

8	a.	With neat block diagram, explain the generation PAM waves.	(08 Marks)
	b.	Describe the effect of noise in pulse position modulation.	(06 Marks)
	c.	Explain the working of TDM system with necessary block diagram.	(06 Marks)

9	a.	Explain the construction and regeneration of PCM signal.	(10 Marks)
	b.	Explain the construction of Delta modulation signal.	(06 Marks)
	c.	Write short notes on vocoder.	(04 Marks)

10	a.	What is quantization noise? Derive the output signal to noise ratio of the uniform quantizer.	(07 Marks)
	b.	To transmit a bit sequence 10011011. Draw the resulting waveform using : i) Unipolar NRZ ii) Polar NRZ iii) Unipolar RZ iv) Bipolar RZ v) Manchestor (split phase).	(06 Marks)
	c.	Explain how digitization of video and MPEG is achieved with relevant diagram.	(07 Marks)

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18EC54

Fifth Semester B.E. Degree Examination, July/August 2021
Information Theory and Coding

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

1   a. Define the following with respect to information theory:
   (i)   Self information   (ii) Entropy
   (iii) Rate of information   (iv) Source efficiency   **(04 Marks)**
   b. Find the relationship between Hartley's nats and bits.   **(06 Marks)**
   c. Consider the Markov source shown in Fig.Q1(c). Find:
   (i) State probabilities   (ii) State entropies   (iii) Source entropy
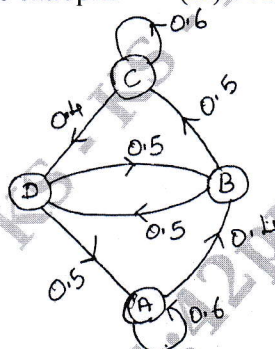

Fig.Q1(c)   **(10 Marks)**

2   a. A source emits one of the four probable messages m_1, m_2, m_3, m_4 with probabilities of 7/16, 5/16, 1/8 and 1/8 respectively. Find the entropy of the source. List all the elements for the second extension of this source. Hence show $H(s^2) = 2H(s)$.   **(08 Marks)**
   b. Prove extremal property of entropy.   **(06 Marks)**
   c. In a facsimile transmission of picture, there are about 2.25×10^6 pixel frame. For a good reproduction 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 minitus. What is the source efficiency of this facsimile transmitter?   **(06 Marks)**

3   a. Define non-singular and uniquely decidable codes with an example.   **(04 Marks)**
   b. A source emits an independent sequence of symbols from an alphabet consisting of five symbols A, B, C, D and E with probabilities of ¼, 1/8, 1/8, 3/16 and 5/16 respectively. Find the Shannon code for each symbol and efficiency of the coding scheme.   **(10 Marks)**
   c. State and prove Shannon's first theorem.   **(06 Marks)**

4   a. State Prefix and Kraft McMillan inequality property.   **(04 Marks)**
   b. A source produces nine symbols x_1, x_2......x_9 with respective probabilities of 0.24, 0.23, 0.19, 0.13, 0.08, 0.06, 0.04, 0.02 and 0.01.
   (i)   Construct a Shannon-Fano ternary code.
   (ii)   Determine the code-efficiency and redundancy.
   (iii) Draw code-tree.
   (iv)   Determine the probabilities of 0, 1 and 2 when the encoding alphabet is {0, 1, 2}.   **(10 Marks)**

c. Find the minimum number of symbols 'r' in the coding alphabet for devising an instantaneous code such that w = {0, 5, 0, 5, 5}. Device such a code. (Note: w represents the set of code words of length 1, 2, 3....) **(06 Marks)**

5 a. Show that $H(X, Y) = H\left(\dfrac{X}{Y}\right) + H(Y)$. **(04 Marks)**

   b. A non-symmetric binary channel is given in Fig.Q5(b).

   (i) Find H(X), H(Y), $H\left(\dfrac{X}{Y}\right)$ and $H\left(\dfrac{Y}{X}\right)$ given $P(X = 0) = \dfrac{1}{4}$, $P(X = 1) = \dfrac{3}{4}$, $\alpha = 0.75$, $\beta = 0.9$.

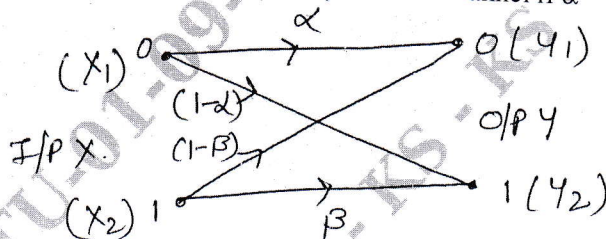   (ii) Find the capacity of the binary symmetric channel if $\alpha = \beta = 0.75$.

Fig.Q5(b)

   c. Show that the mutual information of a discrete channel is symmetric. **(10 Marks)** **(06 Marks)**

6 a. Derive an expression for channel capacity of binary Erasure channel. **(08 Marks)**

   b. For the JPM given below, compute individually H(X), H(Y), H(X, Y), $H\left(\dfrac{X}{Y}\right)$, $H\left(\dfrac{Y}{X}\right)$ and I(X, Y).

$$P(X, Y) = \begin{bmatrix} 0.05 & 0 & 0.20 & 0.05 \\ 0 & 0.10 & 0.10 & 0 \\ 0 & 0 & 0.20 & 0.10 \\ 0.05 & 0.05 & 0 & 0.10 \end{bmatrix}$$

(08 Marks)

   c. What is joint probability matrix? State its properties. **(04 Marks)**

7 a. Define Hamming weight, Hamming distance and minimum distance of linear block codes (with example). **(06 Marks)**

   b. 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 G and H.
   (ii) Draw the encoding circuit.
   (iii) Find all possible valid code vectors.
   (iv) A single error has occurred each of these received vectors. Detect and correct those errors. (1) RA = [0111110] (2) RB = [1011100]
   (v) Draw the syndrome calculation circuit.

(14 Marks)

8 a. The generator polynomial of a (15, 7) cyclic code is given by $g(x) = 1 + x^4 + x^6 + x^7 + x^8$.
   (i) Draw the syndrome calculation circuit.
   (ii) Find the syndrome of the received polynomial $z(x) = 1 + x + x^3 + x^6 + x^8 + x^9 + x^{11} + x^{14}$ by listing the states of the register used in syndrome calculation circuit.
   (iii) Verify the syndrome obtained in (ii) by using direct hand calculation. **(10 Marks)**

   b. Consider the (15, 11) cyclic code generated by $g(x) = 1 + x + x^4$.
   (i) Draw the feedback register encoding circuit for this cyclic code.
   (ii) Illustrate the encoding procedure with the message vector 01101001011 by listing the state of the register with each input.
   (iii) Verify the code polynomial by using the division method. **(10 Marks)**

9 a. What are convolutional codes? How it is different from block codes. **(05 Marks)**
   b. Consider the convolutional encodes shown in Fig.Q9(b).
   (i) Find the O/P for the message 10011 using time domain approach.
   (ii) Find the O/P for the message 10011 using transform domain approach.
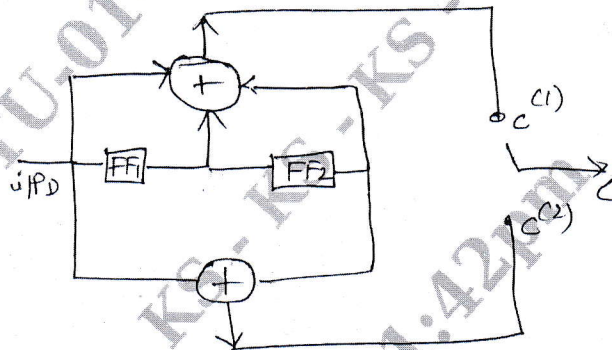
Fig.Q9(b) **(10 Marks)**

   c. What do you understand by trellis diagram of a convolutional encodes? Explain clearly. **(05 Marks)**

10 a. For (2, 1, 3) convolution encodes with g(1) = 1011, g(2) = 1101.
   (i) Write translation table.
   (ii) State diagram.
   (iii) Draw the code tree.
   (iv) Draw the trellis diagram.
   (v) Find the encoded O/P for the message 11101 by traversing the code tree. **(15 Marks)**
   b. Explain Viterbi encoding. **(05 Marks)**

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Fifth Semester B.E. Degree Examination, July/August 2021
Electromagnetic Waves

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Point charges of 50nc each are located at A(1, 0, 0), B(−1, 0, 0), C(0, 1, 0) and D(0, −1, 0). Determine the total force on the charge at A. Also, find $\vec{E}$ at 'A'. **(07 Marks)**

   b. Two point charges, 5μC and −3μC are placed along a straight line 10m apart. Determine the location of third charge, 4μC such that it is subjected to no force. **(07 Marks)**

   c. Derive an expression for electric field intensity at a point due to an infinite sheet charge, ρ_S c/m^2. Compare the nature of this field with that of infinite line charge. **(06 Marks)**

2 a. Given the two points C(−3, 2, 1) and D(5, 20°, −70°), find the spherical coordinates of 'C' and Cartesian coordinates of 'D'. Also find the distance from 'C' to 'D'. **(07 Marks)**

   b. A uniform line charge, infinite in extent, with the density 34nc/m is located at x = −3m and z = 5m in free space. Find $\vec{E}$ at P(1, 12, 4)m. **(07 Marks)**

   c. Find the total charge within each of the indicated volume :
   i) $0 \le \rho \le 0.1$, $0 \le \phi \le \pi$, $2 \le z \le 4$ and $\rho_v = \rho^2 z^2 \sin(0.6\phi)$
   ii) Universe : $\rho_v = \dfrac{e^{-2r}}{r^2}$. **(06 Marks)**

3 a. A cube of side 2m is centred at the origin with edges parallel to the coordinate axes of the rectangular coordinate system. If $\vec{D} = 10\dfrac{x^3}{3}\hat{a}_x, c/m^2$, find the volume charge density. Also, find the total charge enclosed by the cube. **(06 Marks)**

   b. A vector field is given by $\vec{A} = 30e^{-r}\hat{a}_r - 2z\hat{a}_z$, verify the divergence theorem for the volume enclosed by r = 2, z = 0 and z = 5. **(08 Marks)**

   c. Determine the electric field intensity everywhere due to a spherical volume charge of density, ρ_v c/m^3 using Gauss's law. Also, sketch E as a function of distance. **(06 Marks)**

4 a. 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 $\vec{E} = 5x\hat{a}_x + 5y\hat{a}_y, V/m$. **(07 Marks)**

   b. State and explain the continuity equation of current. Also, mention its physical significance. **(08 Marks)**

   c. Given the potential field, V = 2x^{2}y − 5z and a point P(−4, 3, 6), find the numerical values of the following quantities at point, P : i) Electric potential ii) Electric field intensity $\vec{E}$ iii) the direction of $\vec{E}$ iv) electric flux density, $\vec{D}$ v) volume charge density ρ_v. **(05 Marks)**

5 a. Using the Laplace's equation, derive an expression for capacitance per unit length of a coaxial cable using the following boundary conditions :
   V = V$_0$ at r = a, and V = 0 at r = b, b > a. **(08 Marks)**

   b. Determine $\vec{H}$ at (0.4, 0.3, 0) in the field of 8A filamentary current directed inward from infinity to the origin on the positive x–axis and then outward to infinity along the y-axis. **(08 Marks)**

   c. State and explain the Stoke's theorem. **(04 Marks)**

6 a. Given the potential field $V = (Ar^4 + Br^{-4}) \sin(4\phi)$, show that $\nabla^2 V = 0$. Also find A and B such that $V = 100$ volts and $|\vec{E}| = 500V/m$ at $p(1, 22.5°, 2)$. **(07 Marks)**

b. Evaluate both sides of the Stoke's theorem for the field, $\vec{H} = 6xy\hat{a}_x - 3y^2\hat{a}_y, A/m$ and the rectangular path around the region $2 \le x \le 5, -1 \le y \le 1, z = 0$. Let the positive direction of $d\vec{S}$ be $\hat{a}_z$. **(07 Marks)**

c. State the following and write the corresponding equations :

Biot Savart law, Ampere's law and Curl $\vec{F}$. **(06 Marks)**

7 a. Derive an expression for the force acting between two differential current elements. **(04 Marks)**

b. Find the magnetization in a wire where i) $\mu = 1.8 \times 10^{-5}$ H/m, and H = 120A/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) $\beta = 300\mu T$ and $\Psi_m = 15$. **(08 Marks)**

c. A conducting filamentary triangle joins points A(3, 1, 1), B(5, 4, 2) and C(1, 2, 4). The segment AB carries a current of 0.2A in $\hat{a}_{AB}$ direction. The magnetic field is

$\vec{B} = 0.2\hat{a}_x - 0.1\hat{a}_y + 0.3\hat{a}_z$ T.
i) Find the force on segment BC
ii) The torque on the loop about an origin at 'A'
iii) The torque on the loop about an origin at 'C'. **(08 Marks)**

8 a. Obtain the torque on a square loop having the corners (–2, –2, 0), (2, –2, 0), (2, 2, 0) and (–2, 2, 0) :

i) About the origin by $\vec{B} = 0.4\hat{a}_x$ T ;

ii) About the origin by $\vec{B} = 0.6\hat{a}_x - 0.4\hat{a}_y$ T and

iii) About (4, 6, 8) by $\vec{B} = 0.4\hat{a}_x + 0.6\hat{a}_y - 0.7\hat{a}_z$ T. Take I = 0.8A. **(08 Marks)**

b. Determine the boundary conditions for the magnetic field at the interface between two different magnetic materials. **(06 Marks)**

c. Derive the Maxwell's equation from Faraday's law of electromagnetic induction. **(06 Marks)**

9 a. Let $\mu = 10^{-5}$H/m, $\epsilon = 4 \times 10^{-9}$F/m, $\sigma = 0$ 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, $\vec{H} = (y + 2 \times 10^6 t)\hat{a}_z$ A/m. **(08 Marks)**

b. Explain the wave propagation in good conductors using the skin depth. **(06 Marks)**

c. For a perfect dielectric medium, $\mu_r = 1$ and $\epsilon_r = 81$ at f = 1MHz. Determine attenuation constant, phase constant, propagation constant, wave length, phase velocity and intrinsic impedance for the medium. **(06 Marks)**

10 a. In a certain dielectric medium, $\epsilon_r = 5$, $\sigma = 0$ and displacement current density.

$\vec{J}_d = 20 \cos(1.5 \times 10^8 t - \beta x)\hat{a}_y$ $\mu A/m^2$. Determine the electric flux density and electric field intensity. **(06 Marks)**

b. Explain the propagation of electromagnetic waves in free space. **(08 Marks)**

c. State and prove Poynting theorem. **(06 Marks)**

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18EC56

Fifth Semester B.E. Degree Examination, July/August 2021
Verilog HDL

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1   a.   Explain the various stages used in VLSI design with a neat flow diagram.   (08 Marks)
    b.   Design a 4-bit ripple carry counter using a top-down design methodology.   (08 Marks)
    c.   Compare the HDL programming to traditional software programming.   (04 Marks)

2   a.   Give the importance of stimulus block. Explain the different styles of stimulus block used for testing the design.   (08 Marks)
    b.   Explain the different levels of abstraction.   (06 Marks)
    c.   Write a pseudo verilog code for 4-bit ripple carry adder with following description.
        i)   Define a module FA with input A, B C in, sum and carry with no internals.
        ii) Instantiate 4 full adders of the type FA in the module Ripple-Add and name them as FA0, FA1, FA2 and FA3.   (06 Marks)

3   a.   Illustrate with examples the data types used to define nets, registers, vectors and arrays.   (08 Marks)
    b.   Differentiate i) $display and$ monitor   ii) $stop and $finish with examples.   (06 Marks)
    c.   Declare a top-level module as TOP for stimulus. Define a constant N of size 8, IN_REG (8 bit) LOAD_EN(1-bit), LOAD_VAL (8-bit) and CLK(1bit) as register variables, and OUI_REG (8-bit) as wire. Instantiate the module shift_reg and call it as SRl. Connect the port by named list.   (06 Marks)

4   a.   Illustrate with example the post connection rule of verilog HDL programming.   (08 Marks)
    b.   Draw the logic diagram of SR latch. Develop the verilog code for SR latch. Identify the components and hence write the test bench to verify the functionality.   (08 Marks)
    c.   Declare the following variables in verilog.
        i)   Net 'A is fixed to logic value '0' at declaration
        ii)   Vector register, Address_bus of 41 bit wide
        iii) A memory MEM containing 256 words of 64 bit each
        iv)   An integer called count.   (04 Marks)

5   a.   Design a 4-bit ripple carry full adder using 1-bit full adder. Develop the verilog code for a 4-bit ripple carry full adder using gate level modeling. Verify the functionality with appropriate test bench.   (08 Marks)
    b.   Given A = 5′b10101 ; B = 5′b11101 ; C = 5′b11001 ; D = 5′b10011. Evaluate.
        i) Y = A & B   ii) Y = ~ (& C)   iii) Y = C ^ D
        iv) Y = C% A   v) Y = A + (D>>>1)   vi) Y = {B[3], C[2], A}   (06 Marks)
    c.   Discuss the gate delays along with its types of delay specification.   (06 Marks)

6 a. Design a 4-bit ripple carry counter using TFF. Write the verilog code using data flow modeling. Verify the code with appropriate test bench. **(08 Marks)**

b. Design a 2×1 MUX using bufif0 and bufif1 gates. Write the verilog code using gate level modeling for the given delay specification.

	Min	Max	Typ
Rise	1	3	2
Fall	3	5	4
Turnoff	5	7	6

(06 Marks)

c. Discuss the types of delays used in the continuous assignment statement. **(06 Marks)**

7 a. i) Differentiate blocking and non-blocking statement with appropriate examples.
  ii) Design a clock with period 40 and a duty cycle of 25% by using the always and initial statement. The value of clock at time = 0 is initialized to 0. Display the value. **(08 Marks)**

b. Design a 4×1 MUX and develop a verilog code using case statement. **(06 Marks)**

c. Bring out the differences and similarities between task and function. **(06 Marks)**

8 a. Compare sequential and parallel block with appropriate example. **(06 Marks)**

b. Define a task to compute the parity of a 16-bit data. Write a verilog code to call task calc-parity to compute the parity. Display the message as even or odd parity. **(08 Marks)**

c. Discuss the for loop and forever statement with example. **(06 Marks)**

9 a. Illustrate with examples the system tasks related to files. **(06 Marks)**

b. Write a verilog program for a positive edge triggered DFF with asynchronous clear (q = 0) and preset (q = 1) using assign and deassign statements. **(06 Marks)**

c. Give the importance of parameter overriding. Explain the two techniques of parameter overriding with examples. **(08 Marks)**

10 a. List the limitation of manually obtained gate level synthesis of design. How these are analyzed and addressed using automated logic synthesis tools. **(08 Marks)**

b. Discuss in detail the steps involved in the logic synthesis flow from RTL to gates with a neat flow diagram. **(08 Marks)**

c. Interpret the gatelevel netlist diagram for the following when run on a synthesis tool.
  i) assign out = (Sel)? I1 : I0 ;
  ii) always @ (posedge clk)
    $q \Leftarrow d$; **(04 Marks)**

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Fifth Semester B.E Degree Examination, July/August 2021
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 term ecosystem was proposed by
   a) A.G. Tansley   b) Marrie Gibbs
   c) Costanza   d) Jacob Van Verkul

2. World environment day is on
   a) 5th May   b) 5th June   c) 18th July   d) 16th August

3. Atmosphere consists of 79% Nitrogen and 21% oxygen by
   a) volume   b) weight   c) density   d) all the three

4. Which of the following is a biotic component of an ecosystem?
   a) Fungi   b) sunlight   c) temperature   d) humidity

5. Which pyramid is always upright
   a) Biomass   b) Energy   c) Food chain   d) Temperature

6. The largest reservoir of nitrogen in our planet is
   a) Oceans   b) Biosphere   c) Atmosphere   d) Fossil fuels

7. In aquatic ecosystem phytoplankton can be considered as a
   a) Consumer   b) Macro consumer   c) Producer   d) Decomposer

8. The basic requirements of human beings are provided by
   a) agriculture   b) nature   c) urbanization   d) industries

9. Environment is the life support system that includes
   a) air   b) water   c) land   d) all the above

10. In an ecosystem biological cycling of materials is maintained by
   a) producer   b) consumer   c) decomposer   d) all the above

11. The primary producer in a forest ecosystem are
   a) Chlorophyll containing plants and trees
   b) Carnivores
   c) Herbivores
   d) Bacteria and other micro organisms.

12. Primary consumers are
   a) herbivores
   c) omnivores
   b) carnivores
   d) macro-consumers

13. Access to food is mainly determined by
   a) human resources
   c) food assistance programs
   b) household income
   d) society/community

14. Which of the following is a climatic factor?
   a) pressure   b) temperature   c) humidity   d) all the above

15. The major atmosphere gas layer is stratosphere is
   a) hydrogen   b) carbon dioxide   c) ozone   d) helium

16. Which atmospheric sphere is close to the earth surface?
   a) troposphere   b) mesosphere   c) stratosphere   d) exosphere

17. Which following gas is absorbed by grew plants from the atmosphere?
   a) water vapour   b) carbon dioxide   c) hydrogen   d) nitrogen

18. Most stable ecosystem is
   a) forest   b) desert   c) river   d) ocean

19. Tropical forests occur is India in
   a) Karnataka   b) Kerala and Assam   c) Maharashtra   d) West Bengal

20. The short term properties of the atmosphere at a given place and time is referred as
   a) climate   b) microclimate   c) weather   d) humidity

21. The green plants are also called as
   a) autotrophs   b) producers   c) converters   d) all the above

22. The percentage of sunlight used by the plants its photosynthesis is about
   a) 0.2%   b) 2.0%   c) 0.02%   d) 20.0%

23. Driving force in an ecosystem is
   a) plants   b) producers   c) solar energy   d) biomass energy

24. Environment means
   a) air and water
   c) soil and water
   b) a beautiful landscape
   d) sum total of all condition

25. Lithosphere consists of
    a) air   b) water   c) rocks and soil   d) all the above

26. Most of the biotic resources are
    a) non-renewable   b) renewable   c) Thum   d) none of these

27. The first international earth summit was held of
    a) Rio-de Janeiro   b) Kyoto   c) Stockholm   d) Paris

28. Economic and social security is required against
    a) unemployment   b) illness   c) old age   d) all the above

29. The thickness of the earth's crust is
    a) between 5 to 70km   b) 200 km
    c) 500 km   d) 1000 km

30. The desert among the following is not a cold desert
    a) Gobi desert   b) Atacama desert
    c) Mojave desert   d) Patagonian desert

31. Sundarban delta is present is which state?
    a) Karnataka   b) West Bengal   c) Kerala   d) Tamil Nadu

32. Mining means
    a) to conserve minerals   b) to check pollution
    c) to extract minerals and ores   d) none

33. EIA can be expanded as
    a) Environment and Industrial Act
    b) Environment and Impact Activities
    c) Environmental Impact Assessment
    d) Environmental Impact Activity

34. In order to protect the health of people living along the adjoining areas of loads on should
    a) plant trees alongside of the roads   b) not allow diesel driven vehicles
    c) shift the people to other places   d) none of the above

35. The pollution caused by transportation depends on
    a) type of the vehicles engine   b) age of the vehicle
    c) traffic congestion   d) all the above

36. Which of the following is a key element of EIA?
    a) scoping   b) screening
    c) identifying and evaluating alternatives   d) all the above

37. Earth day is held every year on
    a) April 22nd b) 5th June   c) November 23rd d) January 26th

38. Major purpose of most of the dams around the world is
    a) power generation   b) flood control
    c) irrigation   d) drinking water supply

39. The adverse effect of modern agriculture is
    a) water pollution
    b) soil degradation
    c) water logging
    d) all the above

40. Which of the following is the most environment friendly agricultural practice?
    a) organic farming
    b) using chemical fertilizers
    c) use of insecticides
    d) none of the above

41. Farmers have a tendency to
    a) use optimum quantity of water
    b) over irrigate their crops
    c) to conserve water
    d) none of the above

42. Water logging is a phenomenon in which
    a) crop patterns are rotated
    b) soil root zone becomes saturated due to over irrigation
    c) erosion of soil
    d) none of the above

43. How we can protect our environment?
    a) plant trees
    b) control pollution
    c) stop deforestation
    d) all of the above

44. Organic farming is
    a) farming without pesticides and chemical fertilizers
    b) promotes soil biological activity
    c) enhances biodiversity
    d) all of the above

45. Impact of mining on environment
    a) brings order into social setup
    b) devastation of Eco system
    c) mineral extraction has no effect on Eco system
    d) sustainable development

46. Soil conservation is a process in which
    a) soil erosion is allowed
    b) soil is aerated
    c) sterile soil is made fertile
    d) soil is protected against loss

47. Soil Erosion can be prevented by
    a) over grazing
    b) deforestation
    c) afforestation
    d) removal of vegetation.

48. Bio-remediation means the removal of contaminants from
    a) water released from industries
    b) soil and ground water
    c) soil
    d) none of the above

49. Terrace farming is practiced is
    a) hilly areas   b) deserts   c) coastal areas   d) plains

50. Effect of modern agriculture on soil is due to
    a) erosion   b) acidification   c) salinization   d) all the above

51. Over grazing results is
    a) soil erosion   b) productive soil
    c) increase of soil nutrients   d) all of the above

52. Molasses from sugar industry in used to generate
    a) bio diesel   b) hydrogen gas   c) bioethanol   d) biomethanol

53. Cholera and typhoid are caused by
    a) virus   b) housefly   c) fungus   d) bacteria

54. Which of the following is most environmental friendly agriculture practice?
    a) using chemical fertilizer
    b) use of bio–compost materials
    c) using alluvial soil
    d) without pesticides and chemical fertilizers

55. Decreased soil fertility through rapid leaching of the essential mineral nutrients is due to
    a) reforestation   b) deforestation
    c) over-exploitation   d) none of the above

56. Which of the following are major environmental issues in mining activities?
    a) air pollution   b) water pollution   c) soil degradation   d) all of these

57. About 71% of the earth surface is conversed by
    a) land   b) vegetation
    c) water   d) none of the above

58. Blue baby syndrome is caused by the contamination of water due to
    a) Nitrates   b) Arsenic   c) phosphates   d) sulphur

59. What is the permissible range of pH for drinking water a per the Indian standards?
    a) 6 to 9   b) 6.5 to 7.5   c) 6.5 to 8.5   d) 6 to 8.5

60. What is the maximum allowable concentration of fluorides in drinking water?
    a) 1.0mg/litre   b) 1.25 mg/litre   c) 1.50 mg/litre   d) 1.75 mg/litre

61. The depletion of trees is causing accumulation of
    a) NO_2 b) SO_2 c) O_2 d) CO_2

62. Earth's atmosphere contains how much percentage of nitrogen?
   a) 98% b) 21% c) 78% d) 12%

63. India has the largest share of which of the following?
   a) manganese b) mica c) copper d) bauxite

64. Conversion of Ammonia to NO_3 by chemical oxidation is termed as
   a) nitrification b) leaching c) denitrification d) mineralization

65. Forest rich area in Karnataka is found in
   a) Western Ghats area b) Bandipur area
   c) Nagarahole area d) Sandur area

66. Mineral resources are
   a) renewable b) available in plenty
   c) non-renewable d) equally distributed

67. The groundwater depends on
   a) amount of rainfall b) runoff
   c) geological formations d) all the above

68. Physical pollution of water is due to
   a) dissolved oxygen b) turbidity
   c) total solids d) BOD

69. Nitrogen fixing bacteria exists in _____ of plants
   a) leaf b) stem c) roots d) flower

70. Which of the following is considered as an alternative fuel?
   a) CNG b) Kerosene c) coal d) petrol

71. Solar radiation consists of
   a) UV b) visible light c) infrared d) all of these

72. Biogas is produced by
   a) microbial activity
   b) harvesting of crops
   c) soil fertility
   d) none of these

73. Chernobyl nuclear disaster occurred is the year
   a) 1986 b) 1984 c) 1952 d) 1987

74. The expansion for OTEC
   a) Ocean Thermal Energy Conversion
   b) Ocean Tidal Energy Conversion
   c) Ocean Tidal Energy Composition
   d) none of these

75. Wind mill farm is existing _____ district of Karnataka.
   a) Chitradurga b) Ballari c) Raichur d) Hassan

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76. Wind energy generation depends on
   a) direction of the wind
   b) humidity
   c) velocity of wind
   d) precipitation

77. Which of the following source of energy is less eco friendly?
   a) biogas
   b) wind
   c) solar
   d) nuclear

78. Silver Iodide is used in
   a) cloud seeding
   b) nitrification
   c) afforestation
   d) decomposition

79. Nuclear power plant in Karnataka is located at
   a) Bhadravathi
   b) Sandur
   c) Kaiga
   d) Raichur

80. Cow dung can be used
   a) as manure
   b) as fuel
   c) for production of biogas
   d) all the above

81. Natural gas contains
   a) carbon dioxide
   b) hydrogen
   c) methane
   d) nitrogen

82. LPG(gas) is a mixture of
   a) N_2 and H_2S
   b) CO_2 and NO_2
   c) Propane and Butane
   d) Methane and Ethane

83. The source of electromagnetic radiation is
   a) sun
   b) wind
   c) tide
   d) water

84. An important NGO involved in global environmental protection is
   a) UNICEF
   b) green peace
   c) BAIF
   d) CPCB

85. ISO : 14000 standards deal with
   a) Pollution Management
   b) Risk Management
   c) Environmental Management
   d) none of these

86. Which state is having highest women literary rate in India?
   a) Maharashtra
   b) Kerala
   c) Rajasthan
   d) Karnataka

87. Which of the following animal is endangered species of India?
   a) Black buck
   b) Elephant
   c) Giraffe
   d) Lion

88. The leader of Chipko movement is
   a) Medha Patkar
   b) Sundarlal Bahuguna
   c) Suresh Hablikar
   d) Vandana Shiva

89. The Tiger Conservation Project was started it's the year
   a) 1984
   b) 1972
   c) 1999
   d) 2004

90. LANDSAT is a
   a) satellite
   b) aircraft
   c) satellite launching station
   d) none of these

91. GIS receives data from
    a) existing maps
    b) GPS
    c) remote sensing data
    d) all the above

92. Which of the following cannot be achieved by remote sensing?
    a) land use pattern
    b) detection of forest fires
    c) prevention of earthquakes
    d) none of these

93. Leachate is a coloured liquid, that comes out of
    a) sanitary landfills
    b) septic tanks
    c) compost plants
    d) aerated lagoons

94. Ozone day is observed on
    a) 3rd January
    b) 26th March
    c) 16th September
    d) 10th November

95. Greenhouse effect is related to
    a) global warming
    b) grasslands
    c) green buildings
    d) none of these

96. Bhopal gas tragedy was caused due to the leakage of
    a) Sulphurdioxide
    b) Methane
    c) Butane
    d) Methyl ISO-cyanate

97. Bhopal gas tragedy happened in the year
    a) Dec 1984   b) Dec 1983   c) Dec 1994   d) Dec 1987

98. Petroleum based vehicles unit traces of
    a) CO and NO_2 b) SPM   c) Aldehydes   d) CH_4

99. Sound beyond which of the following level can be regarded as a noise pollution?
    a) 40dB   b) 80dB   c) 15dB   d) 75dB

100. Noise pollution limit at residential area
     a) 45dB   b) 80dB   c) 55dB   d) 90dB

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