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CBCS SCHEME 2019-20

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17EC52

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Show that finite duration sequence of length L can be reconstructed from the equidistant N samples of its Fourier transform, where $N \geq L$. **(06 Marks)**

b. Compute the 6 – point DFT of the sequence $x(n) = \{1, 0, 3, 2, 3, 0\}$. **(08 Marks)**

c. Find the N-point DFT of the sequence $x(n) = a^n$, $0 \leq n \leq N-1$. **(06 Marks)**

OR

2 a. Determine the 6-point sequence x(n) having the DFT $X(K) = \{12, -3 - j\sqrt{3}, 0, 0, 0, -3 + j\sqrt{3}\}$. **(08 Marks)**

b. Derive the equation to express z – transform of a finite duration sequence in terms of its N-point DFT. **(06 Marks)**

c. Compute the circular convolution of the sequences $x_1(n) = \{1, 2, 2, 1\}$ and $x_2(n) = \{-1, -2, -2, -1\}$. **(06 Marks)**

Module-2

3 a. State and prove the modulation property (multiplication in time-domain) of DFT. **(06 Marks)**

b. The even samples of an eleven-point DFT of a real sequence are : $X(0) = 8$, $X(2) = -2 + j3$, $X(4) = 3 - j5$, $X(6) = 4 + j7$, $X(8) = -5 - j9$ and $X(10) = \sqrt{3} - j2$. Determine the odd samples of the DFT. **(06 Marks)**

c. An LTI system has impulse response $h(n) = \{2, 1, -1\}$. Determine the output of the system for the input $x(n) = \{1, 2, 3, 3, 2, 1\}$ using circular convolution method. **(08 Marks)**

OR

4 a. State and prove circular time reversal property of DFT. **(06 Marks)**

b. Determine the number of real multiplications, real additions, and trigonometric functions required to compute the 8-point DFT using direct method. **(04 Marks)**

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

Module-3

5 a. Compute the 8-pont DFT of the sequence $x(n) = \cos(\pi n/4)$, $0 \leq n \leq 7$, using DIT-FFT algorithm. **(10 Marks)**

b. Given $x(n) = \{1, 2, 3, 4\}$, compute the DFT sample X(3) using Goestzel algorithm. **(06 Marks)**

c. Determine the number of complex multiplications and complex additions required to compute 64-point DFT using radix.2 FFT algorithm. **(04 Marks)**

OR

6 a. Determine the sequence x(n) corresponding to the 8-point DFT X(K) = {4, 1–j2.414, 0, 1–j0.414, 0, 1+j0.414, 0, 1+j2.414} using DIF-FFT algorithm. **(10 Marks)**

b. Draw the signal flow graph to compute the 16-point DFT using DIT-FFT algorithm. **(04 Marks)**

c. Write a short note on Chirp–z transform. **(06 Marks)**

Module-4

7 a. Draw the direct form I and direct form II structures for the system given by :

$$H(z) = \frac{z^{-1} - 3z^{-2}}{1 + 4z^{-1} + 2z^{-2} - 0.5z^{-3}}.$$ **(08 Marks)**

b. Design a digital Butterworth filter using impulse–invariance method to meet the following specifications :

$0.8 \le |H(\omega)| \le 1, \quad 0 \le \omega \le 0.2\pi$

$|H(\omega)| \le 0.2, \quad 0.6\pi \le \omega \le \pi$

Assume T = 1. **(12 Marks)**

OR

8 a. Draw the cascade structure for the system given by :

$$H(z) = \frac{(z-1)(z-3)(z^2+5z+6)}{(z^2+6z+5)(z^2-6z+8)}.$$ **(08 Marks)**

b. Design a type–I Chebyshev analog filter to meet the following specifications :

$-1 \le |H(\Omega)|\,dB \le 0, \quad 0 \le \Omega \le 1404\pi$ rad/sec

$|H(\Omega)|\,dB \le -60, \quad \Omega \ge 8268\pi$rad/sec **(12 Marks)**

Module-5

9 a. Realize the linear phase digital filter given by :

$$H(z) = 1 + \frac{1}{2}z^{-1} + \frac{1}{3}z^{-2} + \frac{2}{5}z^{-3} + \frac{1}{3}z^{-4} + \frac{1}{2}z^{-5} + z^{-6}$$ **(06 Marks)**

b. List the advantages and disadvantages of FIR filter compared with IIR filter. **(04 Marks)**

c. Determine the values of h(n) of a detail low pass filter having cutoff frequency $\omega_C = \pi/2$ and length M = 11. Use rectangular window. **(10 Marks)**

OR

10 a. An FIR filter is given by : $y(n) = x(n) + \frac{2}{5}x(n-1) + \frac{3}{4}x(n-2) + \frac{1}{3}x(n-3)$. Draw the Lattice structure. **(06 Marks)**

b. Determine the values of filter coefficients h(n) of a high–pass filter having frequency response :

$$H_d(e^{j\omega}) = 1, \quad \frac{\pi}{4} \le |\omega| \le \pi$$

$$= 0, \quad |\omega| \le \frac{\pi}{4}$$

Choose M = 11 and use Hanning windows. **(10 Marks)**

c. Write the time domain equations, widths of main lobe and maximum stop band attenuation of Bartlett window and Hanning window. **(04 Marks)**

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17EC53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Verilog HDL

Time: 3 hrs. Max. Marks: 100

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain typical design flow for designing VLSI IC circuit using the flow chart. **(08 Marks)**

b. Write the verilog code for 4-bit ripple carry counter. **(07 Marks)**

c. What are the advantages of HDLs compared to traditional schematic based design? **(05 Marks)**

OR

2 a. Explain top-down design methodology with example. **(08 Marks)**

b. What are the two styles of stimulus application? Explain each method in brief. **(07 Marks)**

c. Mention the features of verilog HDL. **(05 Marks)**

Module-2

3 a. Explain the following verilog data types with an examples,
(i) Nets
(ii) Registers
(iii) Integers
(iv) Parameters
(v) Arrays **(10 Marks)**

b. Write the verilog description of SR-latch. Also write stimulus code. **(06 Marks)**

c. How to write comments in verilog HDL, explain with examples. **(04 Marks)**

OR

4 a. With neat block diagram, explain the components of verilog module. **(08 Marks)**

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

c. Declare the following variables in verilog:
(i) An 8-bit vector net called a_in.
(ii) An integer called count.
(iii) A memory MEM containing 256 words of 64 bits each.
(iv) A parameter cache_size equal to 512. **(04 Marks)**

Module-3

5 a. Write a verilog data flow description for 4-bit full adder with carry lookahead logic. **(08 Marks)**

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

c. What would be the output of the following a = 4'b0111, b = 4'b1001

(i) &b (ii) a<<<2 (iii) {a, b} (iv) {2{b}} (v) a ^ b
(vi) a | b **(06 Marks)**

OR

6 a. Write the verilog code for 4-to-1 multiplexer using,
(i) Conditional operator (ii) Logic equation. **(06 Marks)**

b. Discuss And, Or and Not gates with respect to logic symbols, gate instantiation and truth tables. **(08 Marks)**

c. Explain assignment delay, implicit assignment delay and net declaration delay for continuous assignment statements. **(06 Marks)**

Module-4

7 a. Explain the blocking assignment statements and non blocking assignment statements with relevant examples. **(08 Marks)**

b. Write a verilog behavioural description of 8 : 1 multiplexer using case statement. **(06 Marks)**

c. Explain Event based timing control with example. **(06 Marks)**

OR

8 a. Discuss sequential and parallel blocks with examples. **(08 Marks)**

b. Write the verilog behavioural description of 4-bit binary counter. **(06 Marks)**

c. Illustrate the use of while loop and repeat loop with suitable examples. **(06 Marks)**

Module-5

9 a. Explain synthesis process with neat block diagram. **(08 Marks)**

b. Write the structural description of 4-bit equality comparator. **(06 Marks)**

c. Explain the following with general syntax and examples (i) Entity (ii) Architecture. **(06 Marks)**

OR

10 a. Discuss the capabilities of VHDL. **(06 Marks)**

b. Write the VHDL code for two 4-bit comparator using data flow description and when-else statement. **(08 Marks)**

c. Explain the declaration of constants, variables and signals in VHDL with examples. **(06 Marks)**

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17EC54

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
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. Suppose you are planning a trip to Miami, Florida from Minneapolis in the winter time. You are receiving the following information from Miami Weather bureau:
(i) Mild and Sunny day (ii) Cold day (iii) Possible snow flurries
Explain the amount of information content in each statement. **(06 Marks)**

b. The output of an information source consists of 128 symbols, 16 of which occurs with probability of $\frac{1}{32}$ and the remaining 112 occurs with probability of $\frac{1}{224}$. The source emits 1000 symbols/sec. Assuming that the symbols are chosen independently. Find the Average Information Rate of this source. **(06 Marks)**

c. The state diagram of a stationary Mark off Source is shown in Fig.Q1(c):
(i) Find the entropy of each state
(ii) Find the entropy of the source
(iii) Find G_1 and G_2 and verify that $G_1 \geq G_2 \geq H$.
Assume $P(1) = P(2) = P(3) = \frac{1}{3}$

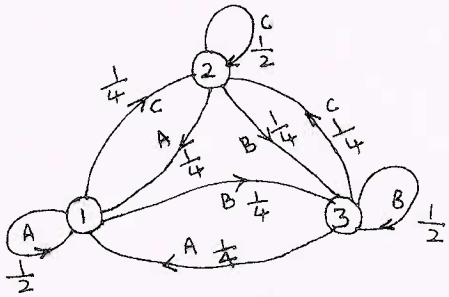

Fig.Q1(c) **(08 Marks)**

OR

2 a. What is self information? Mentions its various measuring units and also mentions the reasons for choosing logarithmic function. **(06 Marks)**

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

c. For the first order Markov statistical model as shown in Fig.Q2(c).
(i) Find the probability of each state (ii) Find H(s) and $H(s^2)$

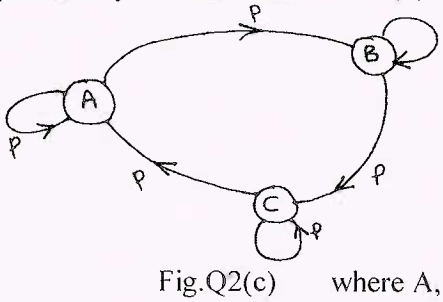

Fig.Q2(c) where A, B, and C are the states. **(08 Marks)**

Module-2

3 a. Identify whether the codes shown in Table.Q3(a) are instantaneous. Justify your answer.

Symbols	Code A	Code B	Code C
S_1	00	1	0
S_2	01	01	100
S_3	10	001	101
S_4	11	00	111

Table.Q3(a) **(06 Marks)**

b. Consider a Discrete Memory Source (DMS) with S = {X, Y, Z} with P = {0.6, 0.2, 0.2}. Find the code word for the message "YXZXY" using Arithmetic code. **(06 Marks)**

c. An information source produces a sequence of independent symbols having the following probabilities. More composite symbol as slow as possible.

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

Construct Binary Huffman encoding and find its efficiency. **(08 Marks)**

OR

4 a. Write the Shannon's Encoding Algorithms. **(06 Marks)**

b. Consider the following source with probabilities:

S = {A, B, C, D, E, F} P = {0.4, 0.2, 0.2, 0.1, 0.08, 0.02}

Find the code words using Shannon-Fano algorithm and also find its efficiency. **(06 Marks)**

c. Consider the following discrete memoryless source:

$S = \{S_0, S_1, S_2, S_3, S_4\}$ P = {0.55, 0.15, 0.15, 0.1, 0.05}

Compute Huffman code by placing composite symbol as high as possible. Also find average code word length and variance of the code word. **(08 Marks)**

Module-3

5 a. What is Joint Probability Matrix? How it is obtained from Channel Matrix and also mention properties of JPM. **(06 Marks)**

b. For the communication channel shown in Fig.Q5(b), determine Mutual Information and Information Rate if r_s = 1000 symbols/sec. Assume $P(X_1) = 0.6$ and $P(X_2) = 0.4$.

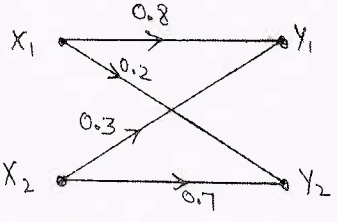

Fig.Q5(b)

(06 Marks)

c. Discuss the Binary Erasure Channel and also prove that the capacity a Binary Erasure Channel is $C = \overline{P} \cdot r_s$ bits/sec. **(08 Marks)**

OR

6 a. What is Mutual Information? Mention its properties. **(06 Marks)**

b. The noise characteristics of a channel shown in Fig.Q6(b). Find the capacity of a channel if r_s = 2000 symbols/sec using Muroga's method.

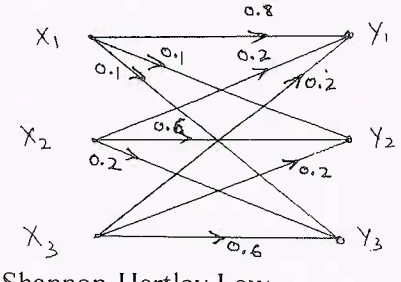

Fig.Q6(b)

(06 Marks)

c. State and prove the Shannon-Hartley Law. **(08 Marks)**

Module-4

7 a. What are the advantages and disadvantages of Error Control Coding? Discuss the methods of controlling Errors. **(06 Marks)**

b. The parity check bits of a (7, 4) Hamming code are generated by

$C_5 = d_1 + d_3 + d_4$

$C_6 = d_1 + d_2 + d_3$

$C_7 = d_2 + d_3 + d_4$

where d_1, d_2, d_3 and d_4 are the message bits.

(i) Find G and H for this code.

(ii) Prove that $GH^T = 0$. **(06 Marks)**

c. Design a syndrome calculating circuit for a (7, 4) cyclic code with $g(X) = 1 + X + X^3$ and also calculate the syndrome of the received vector R = 1110101. **(08 Marks)**

OR

8 a. For a systematic (6, 3) linear block code, the Parity Matrix P is given by

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

(i) Find all possible code words.

(ii) Find error detecting and correcting capability. **(06 Marks)**

b. A (7, 4) cyclic code has the generator polynomial $g(X) = 1 + X + X^3$. Find the code vector both in systematic and non-systematic form for the message bits (1101). **(06 Marks)**

c. Draw the Encoder circuit of a cyclic code using (n – K) bit shift Registers and explain it. **(08 Marks)**

Module-5

9 a. Consider (3, 1, 2) Convolution Encoder with $g^{(1)} = 110$, $g^{(2)} = 101$ and $g^{(3)} = 111$.

(i) Draw the encoder diagram.

(ii) Find the code word for the message sequence (11101) using generator Matrix and Transform domain approach. **(16 Marks)**

b. Discuss the BCH codes. **(04 Marks)**

OR

10 a. Consider the convolution encoder shown in Fig.Q10(a).

(i) Write the impulse response and its polynomial.

(ii) Find the output corresponding to input message (10111) using time and transform domain approach.

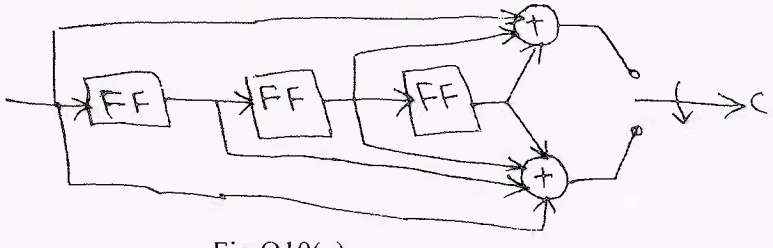

Fig.Q10(a) **(16 Marks)**

b. Write a note on Golay codes. **(04 Marks)**

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17EC561

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Automotive Electronics

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain with necessary diagrams, working of a four stroke SI engine. **(10 Marks)**
b. Briefly explain the working of a spark pluge with neat diagram. **(04 Marks)**
c. Explain the working of disk braking system with neat diagram. **(06 Marks)**

OR

2 a. Explain the effect of air/fuel ratio on engine performance. **(08 Marks)**
b. Define engine performance parameters with relevant formulae and their units. **(08 Marks)**
c. Explain Electronic Ignition System. **(04 Marks)**

Module-2

3 a. With necessary diagrams, explain the working principle of MAP sensor. **(10 Marks)**
b. Explain EGO sensor, with neat diagram. **(10 Marks)**

OR

4 a. Explain Magnetic Reluctance Sensor with relevant diagrams. **(10 Marks)**
b. Explain piezo electric knock sensor. **(10 Marks)**

Module-3

5 a. Explain the control modes for fuel control. **(12 Marks)**
b. Explain Secondary Air Management. **(08 Marks)**

OR

6 a. Explain System diagnostics. **(08 Marks)**
b. Explain Automatic system adjustment. **(08 Marks)**
c. Explain digital modulus in the control unit in brief. **(04 Marks)**

Module-4

7 a. What are the CAN protocol layers? Explain with neat diagram. **(10 Marks)**
b. Explain MOST BUS message format with neat block diagrams and give its application. **(10 Marks)**

OR

8 a. Explain Digital Cruise Control System. **(06 Marks)**
b. Explain Digital Speed Sensor. **(06 Marks)**
c. Explain Throttle actuator. **(08 Marks)**

Module-5

9 a. Explain how ON-Board diagnostics is performed. **(06 Marks)**
b. Explain Engine Analyzer. **(06 Marks)**
c. Explain accelerometer based Air bag system. **(08 Marks)**

OR

10 a. Explain low tire pressure warning system. **(08 Marks)**
b. Explain collision avoidance Radar warning system. **(08 Marks)**
c. Explain Sign Post navigation. **(04 Marks)**

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17EC/TE/EI/BM/ML/ES51

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Management and Entrepreneurship Development

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define Management. Differentiate between Administration and Management. **(10 Marks)**
b. Briefly explain, whether Management in a Science or Art. **(10 Marks)**

OR

2 a. Explain the importance of Planning. **(10 Marks)**
b. Explain the hierarchy of Plans. **(10 Marks)**

Module-2

3 a. Briefly explain the principles of Organisation. **(10 Marks)**
b. Briefly explain the techniques of selection. **(10 Marks)**

OR

4 a. Briefly explain the Maslow's hierarchy of needs. **(10 Marks)**
b. Differentiate between Autocratic , Participative and Free – Rein leadership style. **(10 Marks)**

Module-3

5 a. What is the meaning of social responsibility of business? Explain social responsibility of business towards different group. **(10 Marks)**
b. Define the term "Entrepreneur". Explain the functions of an Entrepreneur. **(10 Marks)**

OR

6 a. Explain the various barriers of Entrepreneurship. **(10 Marks)**
b. Explain development cycle of Entrepreneur. **(10 Marks)**

Module-4

7 a. Define "Small Scale Industry" and state the characteristics of a SSI. **(10 Marks)**
b. Explain the functions of WTO. **(10 Marks)**

OR

8 a. Explain the objectives of KSFC. **(10 Marks)**
b. Explain the objectives of TECSOK. **(10 Marks)**

Module-5

9 a. Define Project. State and explain the classification of Projects. **(10 Marks)**
b. Explain the criteria's for selecting a Project. **(10 Marks)**

OR

10 a. Explain importance of Network Analysis. **(10 Marks)**
b. Explain briefly advantages and disadvantages of PERT and CPM. **(10 Marks)**

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15ES51

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Management and Entrepreneurship Development

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define the term management and its functions. (06 Marks)
b. List and explain the roles of a manager. (05 Marks)
c. In brief explain whether management is a science or an art. (05 Marks)

OR

2 a. What is planning? List out its importance. (05 Marks)
b. Explain the types of planning. (06 Marks)
c. List and explain the steps employed in decision making. (05 Marks)

Module-2

3 a. Define the meaning of an organization and steps in process of organizing. (05 Marks)
b. What is staffing? Explain its importance. (05 Marks)
c. List and explain the techniques in the selection process. (06 Marks)

OR

4 a. What is motivation? Explain Maslow's need hierarchy theory. (05 Marks)
b. Define the word coordination and its types. (05 Marks)
c. Explain the term leadership and its types. (06 Marks)

Module-3

5 a. Explain the meaning of social responsibilities of business towards various groups. (06 Marks)
b. Define the business ethics and corporate governance. (05 Marks)
c. What is social audit? Explain its importance. (05 Marks)

OR

6 a. Define the meaning of an Entrapreneur and their characteristics. (06 Marks)
b. List and explain types of Entrapreneurs. (05 Marks)
c. Explain the Entrapreneurial development cycle. (05 Marks)

Module-4

7 a. What are SSI's and the impact of globalization and WTO on SSI's? (08 Marks)
b. Define Ancillary industry and tiny industries. (08 Marks)

OR

8 a. List and explain two institutional support of central level institutions. (08 Marks)
b. Explain the services provided by Small Industries Development Organization (SIDO). (08 Marks)

Module-5

9 a. Define product planning and development strategy. (08 Marks)
b. Explain the ways of project identification. (08 Marks)

OR

10 a. Write a note on network analysis. (05 Marks)
b. Explain PERT and CPM. (06 Marks)
c. Define importance for network techniques. (05 Marks)

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15EC52

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Signal Processing

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Derive the expression for DFT and IDFT by using frequency domain sampling of DTFT. **(08 Marks)**

b. Find IDFT of X(k) = {4, -j2, 0, j2}. **(04 Marks)**

c. Determine the circular convolution of the sequences
$x_1(n) = \{2, 4, 6, 3\}$ $x_2(n) = \{1, 3, 2, 1\}$. **(04 Marks)**

OR

2 a. Find the 8-point DFT of the sequence x(n) = {1, 1, 1, 1, 1, 1} by matrix method. **(08 Marks)**

b. Show that the multiplication of two DFT's leads to circular convolution of respective time sequences. **(08 Marks)**

Module-2

3 a. An FIR filter has the impulse response h(n) = {1, 2, 3}, determine the response of the filter for input sequence x(n) = {1, 2}. Use DFT and IDFT technique. **(08 Marks)**

b. In the direct computation of N-point DFT of x(n), how many
i) Complex multiplications
ii) Complex additions
iii) Real multiplications
iv) Real additions
v) Trigonometric functions, evaluations are required. **(08 Marks)**

OR

4 a. Find the output y(n) of a filter whose impulse response 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 7 point circular convolution. **(10 Marks)**

b. The 4 point DFT of a real sequence x(n) is X(k) = {1, j, 1, -j}. Find the DFT's of the following sequence:
i) $x_1(n) = (-1)^n x(n)$
ii) $x_2(n) = x((n+1))_4$
iii) $x_3(n) = x((4-n))_4$ **(06 Marks)**

Module-3

5 a. Derive 8-point DIT-FFT radix-2 algorithm and draw signal flow graph. **(08 Marks)**

b. Find IDFT of x(k) = {36, -4 + j9.7, -4 + j4, -4 + j1.7, -4, -4 – j1.7, -4 – j4, -4 – j9.7}. Using DIF FFT radix -2 algorithm. Use butterfly diagram. **(08 Marks)**

OR

6 a. Derive Goertzel algorithm to compute N-point DFT of an N-point sequence. Provide the direct form – II structure of this algorithm. **(08 Marks)**

b. For sequence x(n) = (2, 0, 2, 0} determine x(2) using Goertzel algorithm. Assume initial conditions are zero. **(04 Marks)**

c. What is chirp signal? Mention the applications of chirp Z transform. **(04 Marks)**

Module-4

7 a. Design a Butterworth analog high pass filter to meet the following specifications: Maximum passband attenuation = 2dB, minimum stop band attenuation = 20dB, passband edge frequency = 200rad/sec, stop band edge frequency = 100 rad/sec. **(12 Marks)**

b. Obtain the direct form – I and direct form – II realization for the following system: $y(n) = 0.75y(n-1) - 0.125y(n-2) + 6x(n) + 7x(n-1) + x(n-2)$ **(04 Marks)**

OR

8 a. Design a butterworth low pass filter using the bilinear transformation for the following specification: $0.8 \le |H(e^{jw})| \le 1$ for $0 \le w \le 0.2\pi$, $|H(e^{jw})| \le 0$ for $0.6\pi \le w \le \pi$

Assume T = 2 **(10 Marks)**

b. Obtain the parallel realization of the system function

$$H(z) = \frac{1 + \frac{1}{3}z^{-1}}{1 - \frac{3}{4}z^{-1} + \frac{1}{8}z^{-2}}$$ **(06 Marks)**

Module-5

9 a. Determine the transfer function H(z) of an FIR filter to implement $h(n) = \delta(n) + 2\,\delta(n-1) + \delta(n-2)$, Using frequency sampling technique. **(08 Marks)**

b. Develop the lattice structure for the difference equation

$$y(n) = x(n) + \frac{2}{5}x(n-1) + \frac{3}{4}x(n-2) + \frac{1}{3}x(n-3)$$ **(08 Marks)**

OR

10 a. Realize FIR linear phase filter for N, even. **(08 Marks)**

b. Design FIR low pass filter for the frequency response

$$H_d(e^{jw}) = \begin{cases} e^{-j2w} & -\pi/4 \le w \le \pi/4 \\ 0 & \pi/4 \le |w| \le \pi \end{cases}$$

Use Hamming window to determine filter coefficient and frequency response. Take M = 5. **(08 Marks)**

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15EC53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Verilog HDL

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the advantages of HDL's over schematic-based design. **(06 Marks)**

b. Explain top-down design methodology and bottom-up design methodology. **(10 Marks)**

OR

2 a. Discuss the trends in HDLs. **(06 Marks)**

b. Explain the design hierarchy using 4-bit ripple carry counter. **(10 Marks)**

Module-2

3 a. Explain the following data types with an example in verilog:
i) Vectors ii) Registers iii) Time iv) Real. **(08 Marks)**

b. What are system tasks and compiler directives? Explain. **(08 Marks)**

OR

4 a. What are the components of SR-latch? Write verilog HDL module of SR-latch. **(08 Marks)**

b. With an example, explain Hierarchical names. **(08 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)**

OR

6 a. Explain conditional and concatenation operator with an example. **(06 Marks)**

b. Write a verilog dataflow description for 4-bit full adder with carry lookahead. **(10 Marks)**

Module-4

7 a. Explain briefly event based timing control in verilog. **(08 Marks)**

b. Explain sequential and parallel blocks of verilog HDL. **(08 Marks)**

OR

8 a. Write a verilog HDL code for JK flip-flop using case statement. **(08 Marks)**

b. With syntax, explain conditional and branching loop statements in verilog HDL. **(08 Marks)**

Module-5

9 a. Explain the advantages and benefits of VHDL. **(06 Marks)**

b. Write a VHDL code for full-adder using two half adder in mixed style description. **(10 Marks)**

OR

10 a. Explain the synthesis process with a block diagram. **(10 Marks)**

b. Differentiate between signal assignment and variable assignment. **(06 Marks)**

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15EC54

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Information Theory and Coding

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define entropy and list the properties of entropy. **(04 Marks)**

b. Consider a zero memory source emitting three symbols s_1, s_2 and s_3 with respective probabilities 0.5, 0.3 and 0.2. Calculate: i) Entropy of the source ii) All symbols and the corresponding probabilities of the second order extension. Also, find entropy of extended source iii) Show that $H(s^2) = 2H(s)$. **(08 Marks)**

c. Show that 1 Nat = 1.443 bits. **(04 Marks)**

OR

2 a. Define Markoff source. Explain with typical transition state diagram. **(06 Marks)**

b. For the Markoff source shown in Fig.Q.2(b), find

i) State probabilities

ii) State entropies

iii) Source entropy.

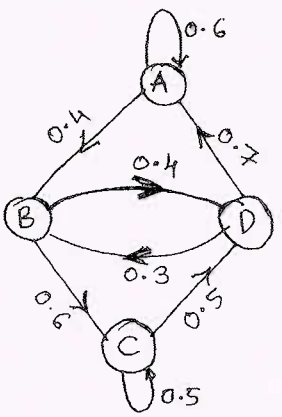

Fig.Q.2(b) **(10 Marks)**

Module-2

3 a. State and prove source coding theorem. **(08 Marks)**

b. Consider a discrete memoryless source with three symbols S = (X, Y, Z) with P = (0.5, 0.35, 0.15)

i) Use Shanon's first encoding technique and find the codewords for the symbols. Also, find the source efficiency and redundancy.

ii) Consider the second order extension of the source. Recompute the codewords, efficiency and redundancy. **(08 Marks)**

OR

4 a. Consider a discrete memoryless source with S = {A, B, C, D} with P = {0.4, 0.3, 0.2, 0.1}. Find the codeword using Huffman coding. Compute efficiency and variance. **(08 Marks)**

b. Write a note on LZ-Algorithm with an example. **(08 Marks)**

Module-3

5 a. Show that **(06 Marks)**

b. For the Joint Probability Matrix (JPM) given, find: i) H(X) ii) H(Y) iii) H(X, Y) iv) H(Y/X) and v) H(X/Y)

$$JPM = P(X,Y) = \begin{array}{c} \\ x_1 \\ x_2 \\ x_3 \\ x_4 \end{array} \begin{array}{c} \begin{array}{cccc} y_1 & y_2 & y_3 & y_4 \end{array} \\ \begin{bmatrix} 0.2 & 0 & 0 & 0.05 \\ 0 & 0.15 & 0.15 & 0 \\ 0 & 0 & 0.10 & 0.05 \\ 0.10 & 0.10 & 0 & 0.10 \end{bmatrix} \end{array}$$ **(10 Marks)**

OR

6 a. State and explain Muroga's theorem. **(04 Marks)**

b. Find the capacity of the channel for the channel matrix P(Y/X):

$$P(Y/X) = \begin{array}{c} \\ x_1 \\ x_2 \\ x_3 \end{array} \begin{array}{c} \begin{array}{ccc} y_1 & y_2 & y_3 \end{array} \\ \begin{bmatrix} 0.2 & 0.5 & 0.3 \\ 0.2 & 0.6 & 0.2 \\ 0.1 & 0.1 & 0.8 \end{bmatrix} \end{array}$$ **(08 Marks)**

c. Briefly explain Differential Entropy. **(04 Marks)**

Module-4

7 a. Briefly explain the need of parity/redundant bits in the data transmission. Also, explain how errors can be tackled using,
i) FEC (Forward Error Correction) ii) ARQ codes (Automatic Repeat Request Codes). **(06 Marks)**

b. Consider a (6, 3) Linear Block Code (LBC) with generator matrix

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

Find:
i) All codewords
ii) All Hamming weights
iii) Minimum Hamming weight and distance
iv) Parity Check Matrix (PCM)
v) Draw the encoder circuit. **(10 Marks)**

OR

8 a. Explain the syndrome calculation and error detection with the help of neat circuit diagram for cyclic codes. **(06 Marks)**

b. Consider a (15, 7) binary cyclic code with $g(x) = 1 + x^4 + x^6 + x^7 + x^8$
i) Draw the encoder circuit
ii) Obtain the codeword for the input (00111)
iii) Draw the syndrome calculating circuit. **(10 Marks)**

Module-5

9 a. Briefly explain: i) Golay codes ii) BCH codes. **(06 Marks)**

b. Consider the convolution encoder shown in Fig.Q.9(b).

i) Write the impulse response of the encoder.

ii) Find the output for the message (10011) using time-domain approach.

iii) Find the output for the message (10011) using transform domain approach.

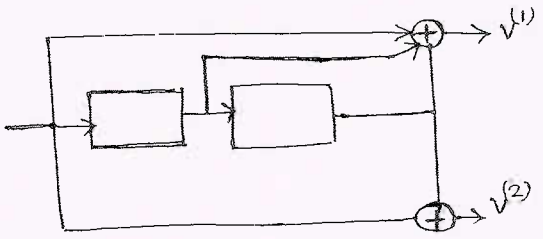

Fig.Q.9(b) **(10 Marks)**

OR

10 a. Explain various ways to represent convolution codes. **(06 Marks)**

b. For the convolution encoder $g^{(1)} = 110$, $g^{(2)} = 101$, $g^{(3)} = 111$

i) Draw the encoder block diagram for (3, 1, 2) convolution code

ii) Find generator matrix

iii) Find codewords corresponding to information sequence 11101 using time domain and transform domain approach. **(10 Marks)**

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15EC553

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Operating System

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing full question from each module.*

Module-1

1 a. Define operating system. Explain goals and operation of an operating system. **(10 Marks)**

b. Explain different computational structures in an operating system. **(06 Marks)**

OR

2 a. Briefly explain the different classes of operating system, specifying the primary concern and key concepts used. **(10 Marks)**

b. In MPOS I/O bound programs should given higher priority than CPU bound programs justify with timing diagram. **(06 Marks)**

Module-2

3 a. Define process control block, explain its content. **(08 Marks)**

b. What is a thread? Compare kernel and user level thread. **(08 Marks)**

OR

4 a. Compare non preemptive and preemptive scheduling. **(08 Marks)**

b. With neat block diagram explain scheduling in a time sharing system. **(08 Marks)**

Module-3

5 a. Describe fixed and variable partitioned contiguous memory allocation schemer along with their merits and demerits. **(08 Marks)**

b. Explain the non contiguous allocation method. **(08 Marks)**

OR

6 a. Explain the data structure in Virtual Memory (VM) handler. **(08 Marks)**

b. For the following page reference string calculate the number of page faults with FIFO when
i) Number of page frames are three
ii) Number of page frames are four
Page reference string : 5 4 3 2 1 4 3 5 4 3 2 1 5. **(08 Marks)**

Module-4

7 a. With a neat diagram, explain the facilities provided by file system and IOCS layers. **(08 Marks)**

b. Explain the different operations performed on files. **(08 Marks)**

OR

8 a. Discuss methods of allocation of disk space with block representation. **(08 Marks)**

b. Explain implementation of file access to open a file. **(08 Marks)**

Module-5

9 a. Explain implementation of message passing in detail. **(08 Marks)**

b. Explain the interposes communication in UNIX by pipe, message queue and socket technique. **(08 Marks)**

OR

10 a. What is dead lock? Explain dead locks in resource allocation. **(08 Marks)**

b. Explain dead lock detection algorithm. **(08 Marks)**

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15EC561

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Automotive Electronics

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define the engine performance terms power, BSFC, torque and volumetric efficiency with relevant formulae and their units. **(08 Marks)**

b. Explain in detail the operating principle including charging, eliciting the electro chemical processes in the lead cell. **(08 Marks)**

OR

2 a. What are the major controller inputs and outputs from / to engine? Show their connection between engine and controller. **(08 Marks)**

b. Explain the electronic fuel control system with a block diagram. **(08 Marks)**

Module-2

3 a. Explain the working of mass flow sensor with relevant diagrams. **(08 Marks)**

b. Explain in detail with suitable drawings the principle of operation of exhaust gas recirculation actuator. **(08 Marks)**

OR

4 a. Write short notes on the following :
i) Optical crank shaft position sensor
ii) Piezo electric knock sensor. **(08 Marks)**

b. What is an EGO sensor? What are the desirable EGO characteristics? Explain its witching characteristics. **(08 Marks)**

Module-3

5 a. Explain in brief the real time capability of software requirements detailing structure, different interrupt controls with necessary examples and time frame. **(08 Marks)**

b. Explain in detail with relevant block diagram and graph the distributor less ignition system. **(08 Marks)**

OR

6 a. Explain in detail with drawings and interfacing block diagram with controller the idle air control. **(08 Marks)**

b. Explain with diagram the engine control system using speed density method. **(08 Marks)**

Module-4

7 a. What are the CAN protocol layers? What are the four different frames? Explain in detail. Also write the message format. **(08 Marks)**

b. Explain in detail with suitable drawings and block diagrams the electronic suspension system. **(08 Marks)**

OR

8 a. Explain the purpose of coupling of networks and examples of networked vehicles. **(08 Marks)**

b. Explain with suitable drawings the electronic steering control. **(08 Marks)**

Module-5

9 a. Explain in detail the low tire-pressure warning system with relevant drawings. **(08 Marks)**

b. Explain the concept of automatic driving control with suitable block diagrams. **(08 Marks)**

OR

10 a. Briefly explain how sensor multiplexing and control signal multiplexing are used in automotive electronics with suitable block diagrams. **(08 Marks)**

b. Briefly explain how expert systems can be used in automotive electronics. **(08 Marks)**

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15EC61

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Communication

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define Hilbert transform. State the properties of it. **(04 Marks)**

b. Obtain the Hilbert transform of

i) $x(t) = (\cos 2\pi Ft + \sin 2\pi Ft)$

ii) $x(t) = c^{-j2\pi Ft}$ **(04 Marks)**

c. Explain canonical representation of band pass signal. **(08 Marks)**

OR

2 a. Derive the expression for the complex low pass representation of bandpass systems. **(08 Marks)**

b. For the given data stream 11011100. Sketch the line code

i) Unipolar NRZ

ii) Polar NRZ

iii) Unipolar RZ

iv) Bipolar NRZ **(04 Marks)**

c. Draw the power spectra of NRZ unipolar and NRZ polar format. **(04 Marks)**

Module-2

3 a. Show that the energy of a signal is equal to squared length of the signal vector. **(08 Marks)**

b. Obtain the decision rule for maximum likelihood decoding and explain the correlation receiver. **(08 Marks)**

OR

4 a. Explain the correlation receiver using product integrator and matched filter. **(08 Marks)**

b. Three signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ are shown in Fig.Q.4(b). Apply Gram Schmidt procedure to obtain an orthonormal basis for the signals. Express signals $s_1(t)$, $s_2(t)$ and $s_3(t)$ in terms of orthonormal basis functions. **(08 Marks)**

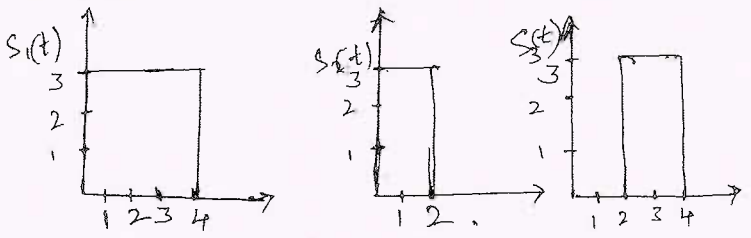

Fig.Q.4(b)

Module-3

5 a. With necessary diagrams, explain the generation and reception of BPSK signal. **(10 Marks)**

b. Given the binary data 10010011, draw the BPSK and DPSK waveforms. **(06 Marks)**

OR

6 a. Derive the expression for error probability of BFSK. **(08 Marks)**

b. With block diagram explain generation and detection of DPSK. **(08 Marks)**

Module-4

7 a. What is ISI? Obtain the expression of output of a filter with intersymbol interference. **(08 Marks)**

b. Explain the Nyquist criterion for distortionless baseband binary transmission and obtain the ideal solution for zero ISI. **(08 Marks)**

OR

8 a. Draw and explain the time-domain and frequency domain of duobinary and modified duobinary signal. **(08 Marks)**

b. What is channel equalization? With a neat diagram, explain the concept of equalization using a linear transversal filter. **(08 Marks)**

Module-5

9 a. Draw the 4 stage linear feedback shift register with 1st and 4th state is connected to Modulo-2 adder. Output of Modulo-2 is connected to 1st stage input. Find the output PN sequence and write the autocorrelation function with initial state 1000. **(06 Marks)**

b. Explain the generation of direct sequence spread spectrum with relevant waveforms and spectrums. **(07 Marks)**

c. Write a short note on application of spread spectrum in wireless LAN's. **(03 Marks)**

OR

10 a. With necessary block diagram, explain the transmitter and receiver of frequency hop spread spectrum. **(08 Marks)**

b. With a neat block diagram, explain the CDMA system based on IS-95. **(08 Marks)**

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15EC63

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
VLSI Design

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the step-by-step CMOS P-Well fabrication process. **(08 Marks)**

b. With the mathematical equations, explain velocity saturation and mobility degradation effect due to increase in saturation current. **(08 Marks)**

OR

2 a. With the transfer characteristic of skewed inverter, explain the beta ratio effects. **(06 Marks)**

b. Compare CMOS and bipolar technologies. **(06 Marks)**

c. Consider the nMOS transistor in a 180 nm process with a nominal threshold of 0.4V and doping level of 8×10^{17} cm^{-3}. The body is tied to ground with a substrate contact. How much does the threshold change at room temperature if the source is at 1.1V instead of '0'? **(04 Marks)**

Module-2

3 a. Discuss the λ-based design rules (i) Butting contact (ii) Transistors (nMOS, pMOS and CMOS) **(08 Marks)**

b. Derive the expression of delay interms of τ for CMOS inverter pair. **(08 Marks)**

OR

4 a. Draw the layout for $\overline{Y} = A + BC$ using CMOS. **(08 Marks)**

b. Find the C_{in} for the layout shown in Fig.Q4(b).

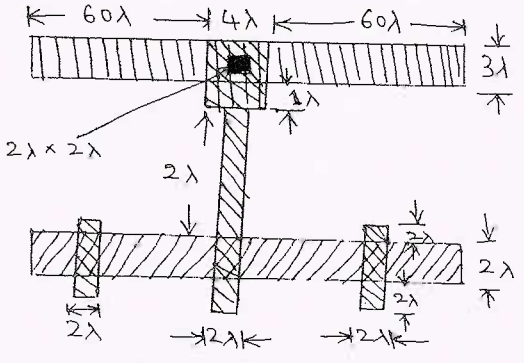

Fig.Q4(b) **(08 Marks)**

Module-3

5 a. Define scaling. Explain the scaling factors for device parameters. **(08 Marks)**

b. What is Manchester Carry Chain? Explain it. **(08 Marks)**

OR

6 a. What are the problems associated with VLSI design and how to reduce by using standard practice? **(06 Marks)**

b. Draw the 4 × 4 cross bar switch using MOS switches and explain it. **(06 Marks)**

c. Calculate the Regularity for 4 × 4 bit and 8 × 8 bit shifter. **(04 Marks)**

Module-4

7 a. Construct a stick diagram for an nMOS parity generator as shown in Fig.Q7(a). The required response is such that z = 1 if there is an even number (including zero) of 1s on the input and z = 0 if there is an odd number.

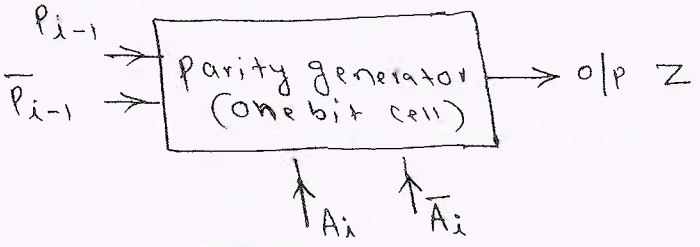

Fig.Q7(a) **(08 Marks)**

b. Draw the block diagram of Generic structure of an FPGA fabric and explain it. **(08 Marks)**

OR

8 a. Construct a stick diagram for an multiplexer shown in Fig.Q8(a) using CMOS.

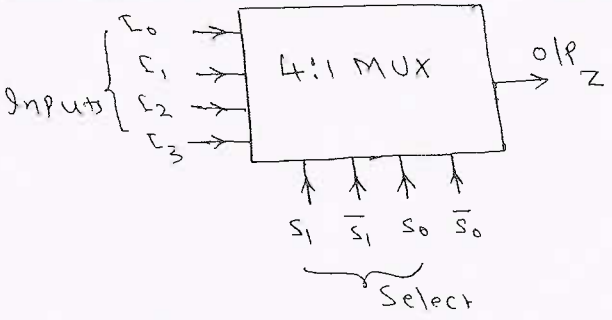

Fig.Q8(a) **(08 Marks)**

b. Explain the goals and techniques of FPGA based system design. **(08 Marks)**

Module-5

9 a. What are the requirements for system timing considerations? **(06 Marks)**

b. Explain the operation of a three transistor dynamic RAM cell. **(06 Marks)**

c. Write a note on stuck - at faults. **(04 Marks)**

OR

10 a. With the help of block diagram, explain the process of logic verification. **(08 Marks)**

b. Explain the operation of CMOS pseudo-static memory cell. **(08 Marks)**

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15EC654

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital Switching System

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the different network structures (topologies) used in communication with neat diagram. **(08 Marks)**

b. Explain the principle of operation of four wire circuits with the help of a neat diagram. **(08 Marks)**

OR

2 a. Explain principle of frequency division multiplexing with suitable block diagram. **(08 Marks)**

b. Explain in brief power levels encountered in telecommunication transmission systems . **(08 Marks)**

Module-2

3 a. Explain in brief different functions of a switching system. **(08 Marks)**

b. Explain in brief what do you mean by message switching and circuit switching. **(08 Marks)**

OR

4 a. With a neat diagram, explain basic call processing of incoming and outgoing calls through digital switching systems. **(10 Marks)**

b. Explain the significance of distribution frames with the help of a neat diagram. **(06 Marks)**

Module-3

5 a. Define and explain the following terms :
i) Traffic intensity
ii) Grade of service
iii) Busy hour
iv) Occupancy. **(06 Marks)**

b. Derive the expression for second Erlange distribution starting from the basic principles. **(10 Marks)**

OR

6 a. Starting from the Markov chain model show that the call arrivals follow a Poisson distribution. **(08 Marks)**

b. A group of 20 trunks provides a GOS of 0.01 when offered 12E as traffic :
i) How much GOS is improved if one extra trunk is added to the group
ii) How much does the GOS deteriorate if one trunk is out of service? **(08 Marks)**

Module-4

7 a. With a neat sketch, explain the operation of a space switch. **(08 Marks)**

b. Describe the frame alignment and synchronization networks. **(08 Marks)**

OR

8 a. Explain in brief basic software architecture used in digital switching systems. **(10 Marks)**

b. Explain in brief call models and connect sequence. **(06 Marks)**

Module-5

9 a. Explain in brief generic switch hardware architecture. **(08 Marks)**

b. Explain in brief common characteristics of a digital switching system. **(08 Marks)**

OR

10 a. Explain the organizational interfaces of a typical digital switching system central office. **(10 Marks)**

b. Write short notes on :

i) Reliability analysis of network control processing

ii) Recovery strategy. **(06 Marks)**

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17EC52

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Digital Signal Processing

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Prove that the uniform sampling of Discrete – Time Fourier Transform of a sequence, x(n) results in N – point DFT. **(07 Marks)**

b. Evaluate the N – point DFT of a sequence $x(n) = 1 + \cos^2\left(\frac{2\pi n}{N}\right)$; $0 \le n \le N-1$. **(07 Marks)**

c. Derive the relationship of N – point DFT with Z - transform. **(06 Marks)**

OR

2 a. Define the DFT and IDFT of a sequence. Show that N – point DFT and IDFT are periodic with period 'N'. **(07 Marks)**

b. Let x(n) be a finite length sequence with its DFT x(k) = {1, 4j, 0, -4j}. Find the DFTs of

i) $x_1(n) = e^{\frac{j\pi n}{2}} . x(n)$ ii) $x_2(n) = \cos\left(\frac{\pi n}{2}\right).x(n)$ iii) $x_3(n) = x((n-1))_4$.

Keep answer in terms of x(k). **(07 Marks)**

c. Compute the IDFT of a sequence x(k) = {24 , -2j , 0 , 2j}. **(06 Marks)**

Module-2

3 a. State and prove i) Circular time shift property ii) Circular convolution property of DFTs. **(08 Marks)**

b. Define Twiddle factor. Prove the following properties of Twiddle factor :
i) Periodicity property ii) Symmetry property. **(04 Marks)**

c. Find the output y(n) of a filter whose impulse response h(n) = {1, 2, 3, 4} for an input x(n) x(n) = {1, 2, 1, -1, 3, 0, 5, 6, 2, -2, -5, -6, 7, 1, 2, 0, 1}. Using overlap – add method. Use 6 – point circular convolution. **(08 Marks)**

OR

4 a. In direct computation of N – point DFT, how many i) Complex additions ii) Complex multiplications iii) Trigonometric functions are required to calculate. Also explain the need of FFT algorithms. **(06 Marks)**

b. Given $x_1(n)$ = {1, 2, 3, 4} and $x_2(n)$ = {1, 2, 2}. Compute circular convolution $x_3(n)$ of $x_1(n)$ with $x_2(n)$ using Concentric Circle method. **(07 Marks)**

c. Compute convolution of x(n) = {$\underset{\uparrow}{1}$, 2, 3} with h(n) = {$\underset{\uparrow}{4}$, 5} using DFT and IDFT method. **(07 Marks)**

Module-3

5 a. Find 8 – point DFT of a sequence x(n) = {1, 2, 3, 4, 4, 3, 2, 1} using Radix – 2 DIT – FFT algorithm. **(10 Marks)**

b. What is Geortzel Algorithm? Obtain Direct form – II structure for the Geortzel filter. **(10 Marks)**

OR

6 a. Develop Radix – 2 DIF FFT algorithm and draw complete signal flow graph for N = 8. **(10 Marks)**

b. Compute the 8- point IDFT of a sequence.
X(k) = {7, - 0.707 – j0.707, -j , 0.707 –j0.707, 1 , 0.707 + j0.707, j , -0.707 + j0.707} using Radix – 2 DIF FFT algorithm. **(10 Marks)**

Module-4

7 a. Derive an expression for the order of analog Butterworth prototype low pass filter. **(08 Marks)**

b. Design a digital Butterworth filter using Bilinear transformation method to meet following :
i) Stopband attenuation ≤ 1.25 dB at passband edge frequency of 200Hz and
ii) Stopband attenuation ≥ 15dB at stopband edge frequency of 400Hz. Take sampling frequency of 2KHz. **(12 Marks)**

OR

8 a. An analog third order Butterworth low-pass filter has the transfer function

$H_a(s) = \dfrac{1}{(s+1)(s^2+s+1)}$. Design the corresponding digital filter using impulse invariance method. **(08 Marks)**

b. Obtain direct form – I , direct form – II , Cascade form and Parallel form realization of the system defined by

$$H(z) = \frac{(z-1)(z-3)(z^2+5z+6)}{(z^2+6z+5)(z^2-6z+8)}.$$ **(12 Marks)**

Module-5

9 a. Design a linear – phase high pass FIR filter using Hamming window for the following desired frequency response.

$$H_d(e^{jw}) = \begin{cases} 0 & ; \quad |w| < \pi/4 \\ e^{-j2w} & ; \quad \pi/4 \le |w| \le \pi \end{cases}.$$ **(08 Marks)**

b. An FIR filter is defined by difference equation ;
$y(n) = 2.x(n) + \frac{4}{5}x(n-1) + \frac{3}{2}x(n-2) + \frac{2}{3}x(n-3)$. Find lattice coefficients. Also draw direct form and lattice form. **(08 Marks)**

c. Compare FIR filter with IIR filter. **(04 Marks)**

OR

10 a. Design a linear phase FIR filter using rectangular window for the following desired frequency response

$$H_d(e^{jw}) = \begin{cases} e^{-j2w} & ; \quad |w| < \pi/4 \\ 0 & ; \quad \pi/4 \le |w| \le \pi \end{cases}.$$ **(08 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 and Linear phase form. **(08 Marks)**

c. Explain Gibbs phenomenon. Also mention methods to minimize it. **(04 Marks)**

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17EC54

Fifth Semester B.E. Degree Examination, Aug./Sept. 2020
Information Theory & Coding

Time: 3 hrs. Max. Marks: 100

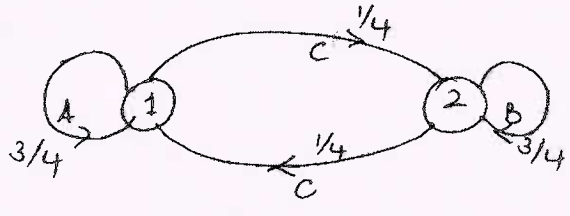
Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Derive the expression for average information content of symbols in a long independent sequence. **(05 Marks)**

b. A radio-jockey has a vocabulary of 10,000 words and he makes an announcement of 1000 words, selecting these words randomly from his vocabulary what is the information conveyed? **(05 Marks)**

c. Consider the Markov source shown in Fig. Q1 (c). Find (i) State entropies (ii) Entropy of the source (iii) G_1, G_2 and show that $G_1 > G_2 > H(s)$. **(10 Marks)**



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

Fig. Q1 (c)

OR

2 a. Express Hartleys in bits and nats. **(04 Marks)**

b. Obtain the entropies of the second and third extensions of a memoryless source emitting two symbols n_1 and n_2 with probabilities $\frac{1}{4}$ and $\frac{3}{4}$. Also show that $H(S^2) = 2H(S)$ and $H(S^3) = 3H(S)$. **(08 Marks)**

c. For the Markov source shown below in Fig. Q2 (c), find (i) State probabilities (ii) State entropies (iii) Entropy of the Markov source. **(08 Marks)**

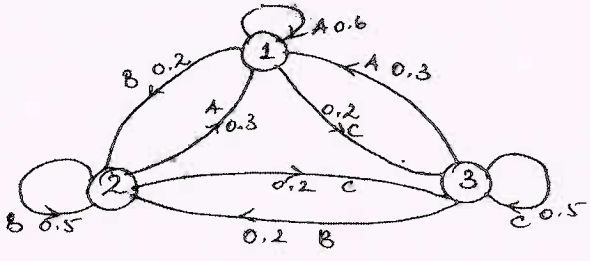


Fig. Q2 (c)

Module-2

3 a. Using Shannon's encoding algorithm encode the symbols A, B, C, D, E with probabilities $\frac{1}{8}, \frac{1}{16}, \frac{3}{16}, \frac{1}{4}$ and $\frac{3}{8}$. Find the coding efficiency and redundancy. **(06 Marks)**

b. State kraft inequality. Find the smallest value of 'r' such that prefix codes can be constructed for the following code length requirements. W = {1, 4, 4, 4, 5} for corresponding $L = \{1, 2, 3, 4, 5\}$. Also suggest a suitable code. **(06 Marks)**

c. State and prove Shannon's source coding theorem. **(08 Marks)**

OR

4 a. Apply the Huffman's encoding procedure for the following set of symbols and hence determine the efficiency of the binary code so formed.

Symbol	x_1	x_2	x_3
Probability	0.7	0.15	0.15

If the same technique is applied to the second order extension of the above messages, what will be the improvement in efficiency? **(10 Marks)**

b. A source emits 4 symbols $\{m_1, m_2, m_3, m_4\}$ with probabilities $\left\{\frac{1}{4}, \frac{1}{2}, \frac{1}{8}, \frac{1}{8}\right\}$. Find the Shannon-Fano ternary code for the above symbols. Also find the efficiency and redundancy of coding. **(05 Marks)**

c. Encode the following information using Lampel-Zir algorithm:
QUEUE_FOR_QUEEN'S_QUEST **(05 Marks)**

Module-3

5 a. For the JPM given below, compute H(X), H(Y), H(X,Y), H(Y/X), H(X/Y) and I(X, Y)

$$P(X,Y) = \begin{bmatrix} 0.24 & 0 & 0.09 & 0.12 \\ 0 & 0.16 & 0.12 & 0.09 \\ 0.06 & 0.03 & 0 & 0.09 \end{bmatrix}$$

(08 Marks)

b. The noise matrix of a channel is as shown below find the capacity using Muraga's method. $P(Y/X) = \begin{bmatrix} 3/4 & 1/4 & 0 \\ 0 & 1/2 & 1/2 \\ 1/3 & 0 & 2/3 \end{bmatrix}$. **(06 Marks)**

c. Prove that $I(A,B) = I(B,A)$ **(06 Marks)**

OR

6 a. Two noisy channels are cascaded as shown below in Fig. Q6 (a). Find H(X), H(Y), H(Z), H(X,Z), H(Z/X) and H(X/Z), given the probability of $p(x_1) = p(x_2) = 0.5$ **(08 Marks)**

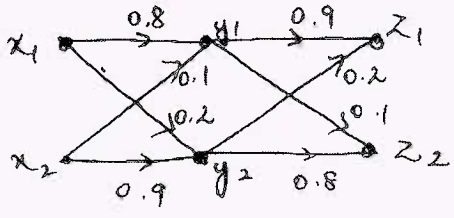


Fig. Q6 (a)

b. Derive the expression for maximum capacity of a Binary Erasure channel. **(07 Marks)**

c. What are continuous channels? Write in brief the various entropies involved in continuous channels. **(05 Marks)**

Module-4

7 a. Consider a (7, 4) linear block code with the check bits defined as follows: $c_5 = d_1 + d_2 + d_3$, $c_6 = d_2 + d_3 + d_4$ and $c_7 = d_1 + d_3 + d_4$. Write the Generator and Parity check matrices. Draw the circuit diagrams of the encoder and syndrome calculator. Also determine the error detection and correction capabilities of this code. **(10 Marks)**

b. Design a feedback shift register encoder and syndrome calculator for a (8, 5) cyclic code with generator polynomial $g(x) = 1 + x + x^2 + x^3$. Find the code vector for the message 11011 in systematic form. List all the states of the register and verify the value using the standard equation. **(10 Marks)**

OR

8 a. Explain in brief : (i) Hamming bound (ii) Linearity property (iii) Minimum distance of a code. **(06 Marks)**

b. Construct the standard array for a (6, 3) linear block code given, $P = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$, where P is the Parity matrix. Detect and correct the errors for the received vectors $R_1 = 100100$ and $R_2 = 000011$. **(10 Marks)**

c. Find the cyclic code in non-systematic format for the data vectors : (i) 1100 (ii) 1011 given $g(x) = 1 + x + x^3$. **(04 Marks)**

Module-5

9 a. Given a (15, 5) BCH code with generator polynomial $g(x) = 1 + x + x^2 + x^4 + x^5 + x^8 + x^{10}$, find the error detecting and correcting capabilities of this code. **(04 Marks)**

b. Consider a (3, 1, 2) convolution code with $g^{(1)} = 110$, $g^{(2)} = 101$, $g^{(3)} = 111$

(i) Draw the encoder block diagram.

(ii) Find the generator matrix and find the codeword corresponding to the information sequence 11101 using time domain approach.

(iii) Also verify the same using transform domain approach. **(10 Marks)**

c. Write short notes on : (i) Code tree (ii) Trellis **(06 Marks)**

OR

10 a. Consider a (2, 1, 2) convolutional encoder with $g^{(1)} = 111$ and $g^{(2)} = 101$. Draw the state diagram and Trellis for this encoder.
Also decode the code sequence {11, 01, 01, 00, 01, 01, 11} using the Viterbi algorithm. **(12 Marks)**

b. What are Golay codes? Explain. **(04 Marks)**

c. Given a (3, 2, 1) convolutional encoder, define its (i) Constraint length (ii) Rate (iii) Draw the block diagram of the encoder. Given $g_1^{(1)} = 11$, $g_1^{(2)} = 10$, $g_1^{(3)} = 11$ and $g_2^{(1)} = 01$, $g_2^{(2)} = 11$, $g_2^{(3)} = 00$ for data $d_1 = 101$ and $d_2 = 110$. **(04 Marks)**

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CBCS SCHEME

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17EC561

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Automotive Electronics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain with necessary diagrams, working of a four stroke IC engine. **(10 Marks)**
b. Briefly explain motivation behind electronic engine control. **(06 Marks)**
c. Write a note on Engine Mapping. **(04 Marks)**

OR

2 a. Explain spark plug configuration, spark pulse generation and ignition timing with relevant diagrams. **(10 Marks)**
b. Explain the effect of Air/Fuel ratio in engine performance. **(05 Marks)**
c. With neat diagram, explain Electronic Ignition system. **(05 Marks)**

Module-2

3 a. Explain air flow rate sensor with neat diagram. **(10 Marks)**
b. With neat schematic of solenoid, explain working of fuel injector and pulse mode fuel control with relevant diagram. **(10 Marks)**

OR

4 a. What is Hall effect? Explain with a neat diagram position sensor using principle of Hall effect. Compare it with magnetic reluctance sensor. **(10 Marks)**
b. With neat diagram, explain EGR Actuator. **(10 Marks)**

Module-3

5 What are seven modes of fuel control? Explain them in detail. **(20 Marks)**

OR

6 a. What is Idle speed control? Explain with a neat block diagram idle speed control system. **(10 Marks)**
b. What is the use of secondary air? With the help of diagram, explain how the secondary air is controlled. **(10 Marks)**

Module-4

7 a. Explain with neat diagram Antilock braking system. **(10 Marks)**
b. Explain LIN and Most Bus. **(10 Marks)**

OR

8 a. Explain digital cruise control system with help of relevant diagram. **(10 Marks)**
b. What are CAN Protocol layers? What are the four different frame? Write the message format. **(10 Marks)**

Module-5

9 a. Explain Collision Avoidance Radar Warning system with relevant diagrams. **(10 Marks)**
b. Explain Accelerometer based Airbag system with relevant diagrams. **(10 Marks)**

OR

10 a. Explain with neat diagram Radio Navigation system. **(10 Marks)**
b. Explain the automatic driving control system with relevant diagram. **(10 Marks)**

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CBCS SCHEME

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15EC52

Fifth Semester B.E. Degree Examination, Aug./Sept. 2020
Digital Signal Processing

Time: 3 hrs. Max. Marks: 80

Note: *1. Answer any FIVE full questions, choosing ONE full question from each module.*
2. Use of Normalized filters tables is permitted.

Module-1

1 a. Compute the circular convolution of the following sequences using DFT and IDFT method $x(n) = \{1, 2, 3, 4\}$ and $h(n) = \{4, 3, 2, 1\}$. **(08 Marks)**

b. Given $x(n) = \{1, -2, -2, 5, 8, 2\}$, evaluate the given expression $\sum_{K=0}^{5} e^{-j2\pi k/3} X(K)$ without computing DFT. **(04 Marks)**

c. Obtain the relationship of DFT with z-transforms. **(04 Marks)**

OR

2 a. Explain frequency domain sampling and reconstruction of signals. **(09 Marks)**

b. Consider the finite length sequence $x(n) = \delta(x) + 2\delta(n - 5)$
i) Find the 10 point DFT of x(n)
ii) Find the sequence that has a DFT $y(k) = e^{\frac{j2k2\pi}{10}} x(k)$. **(07 Marks)**

Module-2

3 a. Evaluate the linear convolution of the following sequences using DFT and IDFT method. $x(n)=\{1, 2, 3\}$ and $h(n) = \{1, 2, 2, 1\}$. **(08 Marks)**

b. A long sequence x(n) is filtered through a filter with impulse response h(n) to yield the output y(n). If $x(n) = \{1, 1, 1, 1, 1, 3, 1, 1, 4, 2, 1, 1, 3, 1\}$ and $h(n) = \{1, -1\}$. Compute y(n) using overlap save technique. Use only a 5-point circular convolution. **(08 Marks)**

OR

4 a. State and prove the following properties of DFT i) Parseval's theorem **(06 Marks)**
ii) Time shifting property. **(04 Marks)**

b. Determine the response of an LTI system with $h(n) = \{1, -1, 2\}$ for an input $x(n) = \{1, 0, 1, -2, 1, 2, 3, -1, 0, 2\}$ use overlap add method with block length L = 4. **(06 Marks)**

Module-3

5 a. Find the DFT of the sequence using decimation in time FFT algorithm and draw the flow graph indicating the intermediate values in the flow graph.
$x(n) = \{1, -1, -1, -1, 1, 1, 1, -1\}$. **(08 Marks)**

b. Derive the computational arrangement of 8-point DFT using radix – 2 DIF-FFT algorithm. **(08 Marks)**

OR

6 a. What is Goertzel algorithm? Obtain direct form–II realization of second order goertzel filter. **(08 Marks)**

b. Find the IDFT of the sequence using DIF-FFT algorithm :
$X(k) = \{0, 2\sqrt{2}(1 - j), 0, 0, 0, 0, 2\sqrt{2}(1 + j)\}$. **(08 Marks)**

Module-4

7 a. Draw the block diagrams of direct form – I and direct form – II realizations for a digital IIR filter described by the system function :

$$H(z)=\frac{8z^3-4z^2+11z-2}{(z-\frac{1}{4})(z^2-z+\frac{1}{2})}.$$ **(08 Marks)**

b. Show that the bilinear transformation maps the s-plane to z-plane efficiently in the transformation of analog to digital filter. **(08 Marks)**

OR

8 a. Design a two pass Butterworth analog filter to meet the following specifications :
i) Attenuation of –1db at 20rad/sec
ii) Attenuation is greater than 20db beyond 40rad/sec. **(09 Marks)**

b. The transfer function of analog filter is $H(s)=\frac{2}{(s+1)(s+2)}$. Find H(z) using impulse invariance method. Show H(z) when T_S = 1sec. **(07 Marks)**

Module-5

9 a. A low pass filter is to be designed with the following desired frequency response

$$H_d(e^{j\omega})=H_d(\omega)=\begin{cases}e^{-j2\omega}; & |\omega|<\pi/4\\ 0; & \pi/4<|\omega|<\pi\end{cases}$$

Determine the filter coefficients $h_d(n)$ and h(n) if $\omega(n)$ is a rectangular window defined as follows : $\omega_R(n)=\begin{cases}1; & 0\le n\le 4\\ 0; & \text{otherwise}\end{cases}$. **(08 Marks)**

b. Realize the direct from the linear phase FIR filters for the following impulse response

$$h(n)=\delta(n)+\frac{1}{4}\delta(n-1)-\frac{1}{8}\delta(n-2)+\frac{1}{4}\delta(n-3)+\delta(n-4).$$ **(08 Marks)**

OR

10 a. The frequency response of an FIR filter is given by :

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

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

b. Obtain the coefficients of FIR filter to meet the specification given below using the window method :
i) Pass band edge frequency f_p = 1.5KHz
ii) Stop band edge frequency f_s = 2KHz
iii) Minimum stop band attenuation = 50db (Hamming)
iv) Sampling frequency F_S = 8KHz. **(10 Marks)**

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CBCS SCHEME

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15EC53

Fifth Semester B.E. Degree Examination, Aug./Sept. 2020
Verilog HDL

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. What is HDL? Explain typical design flow for designing of VLSI IC circuits and importance of it. **(10 Marks)**

b. Define the following terms with examples :
i) Module ii) Instances iii) Instance name. **(06 Marks)**

OR

2 a. What is stimulus in verilog? Explain components of a simulation with an example of ripple carry counter. **(12 Marks)**

b. Explain trends in HDL's. **(04 Marks)**

Module-2

3 a. Explain the following lexical conventions
i) Whitespace ii) Operators iii) Strings iv) Keywords. **(08 Marks)**

b. Explain the system tasks in verilog with examples. **(08 Marks)**

OR

4 a. What is the module definition in verilog? And explain the components of a verilog module. **(10 Marks)**

b. What are the different ports is verilog? Explain internal and external port connection rules. **(06 Marks)**

Module-3

5 a. Design a 4-to-1 multiplexer using primitives in verilog and draw a logic diagram for it. **(10 Marks)**

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

OR

6 a. Discuss the different assignment statements with example in verilog HDL. **(08 Marks)**

b. Explain the following : i) Bitwise operators ii) Concatenation
iii) Conditional operators iv) Replication operators. **(08 Marks)**

Module-4

7 a. Write the difference between blocking and non-blocking statement. **(06 Marks)**

b. Explain the following with proper examples
i) For loop statement ii) Repeat iii) Forever loop **(06 Marks)**

c. What is inferring latch? Explain casex and casez with examples. **(04 Marks)**

OR

8 a. Explain sequential and parallel blocks with examples. **(08 Marks)**

b. Write a verilog program for 4 to 1 mulitplexer using if-else-if conditional statement. **(08 Marks)**

Module-5

9 a. Explain the declaration of constant, veriable and signal in VHDL with example. **(08 Marks)**

b. Explain font convention in VHDL. **(08 Marks)**

OR

10 a. What are the different data types and attributes in VHDL and explain each. **(08 Marks)**

b. Write a VHDL program for 4-bit magnitude comparator. **(08 Marks)**

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CBCS SCHEME

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15EC54

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Information Theory and Coding

Time: 3 hrs. Max. Marks: 80

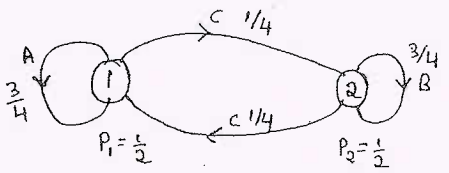
Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Derive an expression for average information content (entropy) of long independent sequence. **(04 Marks)**

b. Consider an information source modeled by a discrete ergodic Markoff random process whose graph is shown in Fig.Q.1(b). Find the source entropy H and the average information content per symbol in messages containing one, two and three symbols that is, find G_1, G_2 and G_3. **(12 Marks)**

Fig.Q.1(b)



OR

2 a. A code is composed of dots and dashes. Assuming that a dash is 3 times as long as a dot and has one third the probability of occurrence. Calculate the information in dot and dash. **(04 Marks)**

b. Design a system to report the heading of a collection of 400 cars. The heading is to be quantized into three levels: heading straight (S), turning left (L), and turning right (R). This information is to be transmitted every second. Based on the test data given below, construct a model for the source and calculate the source entropy and information rate.

i) On the average, during a given reporting interval, 200 cars were heading straight, 100were turning left, and 100 cars were turning right.

ii) Out of 200 cars that reported heading straight during a reporting period, 100 of them (on the average) reported going straight during the next reporting period, 50 of them reported turning left during next period, and 50 of them reported turning right during the next period.

iii) On the average out of 100 cars that reported as turning during a signaling period, 50 of them continued their turn during the next period and the remaining headed straight during the next reporting period.

iv) The dynamics of the cars did not allow them to change their heading from left to right or right to left during subsequent reporting periods. **(12 Marks)**

Module-2

3 a. Consider a source with Alphabet S = (A, B, C, D) with the corresponding probabilities P = (0.1, 0.2, 0.3, 0.4). Find the code words for symbol using Shannons encoding algorithm. Also find the source efficiency and redundancy. **(06 Marks)**

b. Consider the following source:
S = (A, B, C, D, E, F)
P = (0.10, 0.15,0.25, 0.35, 0.08, 0.07)
Find the codewords for the source using Shannon Fano-Algorithm. Also find source efficiency and redundancy. **(06 Marks)**

c. Illustrate with example whether the code is uniquely decodeable or not by applying kraft inequality. **(04 Marks)**

OR

4 a. An information source produces a sequence of independent symbols having the following probabilities:

A	B	C	D	E	F	G
1/3	1/3	1/9	1/9	1/27	1/27	1/27

Construct binary code using Huffman encoding procedure and find its efficiency and redundancies. **(08 Marks)**

b. Discuss the following coding technique with example:
i) Arithmatic coding ii) Lempel-zev algorithm. **(08 Marks)**

Module-3

5 a. The Joint probability matrix of a channel is given by

$$P(xy) = \begin{bmatrix} 0.05 & 0 & 0.20 & 0.05 \\ 0 & 0.1 & 0.10 & 0 \\ 0 & 0 & 0.20 & 0.10 \\ 0.05 & 0.05 & 0 & 0.10 \end{bmatrix}$$

Compute: i) H(X) ii) H(X,Y) iii) $H\left(\frac{Y}{X}\right)$ iv) $H\left(\frac{X}{Y}\right)$ **(08 Marks)**

b. The noise characteristics of channel as shown in Fig.Q.5(b). Find the channel capacity. **(05 Marks)**

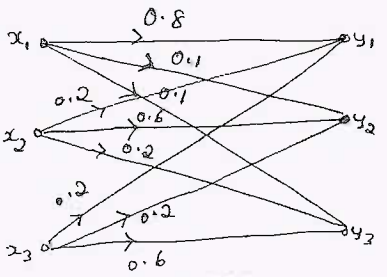


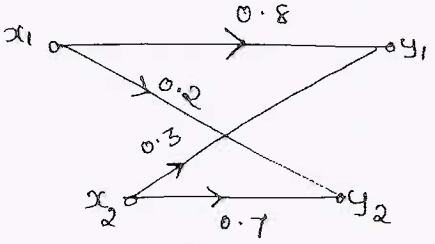
Fig.Q.5(b)

c. State the properties of mutual information. **(03 Marks)**

OR

6 a. A CRT terminal is used to enter alphanumeric data into a computer. The CRT is connected through a voice grad telephone line, usable bandwidth of 3kHz and an output S/N of 10db. Assume that the terminal has 128 characters and data is sent in an independent manner with equal probabilities.
i) Find the average information per character
ii) Find capacity of the channel
iii) Find the maximum rate at which data can be sent from the terminal to the computer without error. **(08 Marks)**

b. Find the mutual information for the channel shown in Fig.Q.6(b). Given that $P(x_1) = 0.6$ and $P(x_2) = 0.4$ **(08 Marks)**



FigQ.6(b)

Module-4

7 a. For a systematic (6, 3) linear block code the parity matrix P is given by

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

Find all possible code vector. **(05 Marks)**

b. Construct the standard array for a (6, 3) linear block code whose generator matrix is given below:

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

Decode the received vector 111100 **(06 Marks)**

c. For a (7, 4) binary cyclic code the generator polynomial is $g(x) = 1 + x + x^3$. Obtain code word for the message 1010 in systematic and non systematic form. **(05 Marks)**

OR

8 a. Design an encoder for the (7, 4) binary cyclic code generated by $g(x) = 1 + x + x^3$ and verify its operation using the message vector (0101). **(06 Marks)**

b. For (7, 4) cyclic code, the received vector $z(x) = 1110101$ and generator polynomial is $g(x) = 1 + x + x^3$. Draw the syndrome calculation circuit and correct the single error in the received vector. **(06 Marks)**

c. Define Hamming weight, Hamming distance and minimum distance with example. **(04 Marks)**

Module-5

9 a. Write a explanatory note on Golay code. **(04 Marks)**

b. The convolution encoder has the following two generator sequence $g^{(1)} = (111)$, $g^{(2)} = (101)$.

i) Draw the convolution encoder

ii) Find the output for the message 10011 using time domain approach. **(06 Marks)**

c. Explain Viterbi algorithm. **(06 Marks)**

OR

10 a. Consider a (3, 1, 2) convolution encoder with $g^{(1)} = (110)$, $g^{(2)} = (101)$ and $g^{(3)} = (111)$.

i) Draw the encoder block diagram

ii) Draw state table

iii) Draw state transition table

iv) Draw state diagram

v) Find the encoder output by traversing through the state diagram for input message sequence of (11101)

vi) Draw code trellis and obtain the output of the encoder for the same input sequence of (11101). **(12 Marks)**

b. Briefly explain BCH codes. **(04 Marks)**

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CBCS SCHEME

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15EC553

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Operating System

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain goals and key concerns of an operating system. **(08 Marks)**

b. Describe Resource Allocations with diagram. **(08 Marks)**

OR

2 a. Explain time sharing systems. **(08 Marks)**

b. Explain features of distributed operating system. **(08 Marks)**

Module-2

3 a. Explain Operating Systems view of processes. **(08 Marks)**

b. Write note on: i) Process Control Block ii) Event Control Block. **(08 Marks)**

OR

4 a. Explain Threads. **(04 Marks)**

b. Perform FCFS scheduling and find average turn around time, average weighted turn around time of given set of processes.

Processes	P1	P2	P3	P4	P5
Arrival Time (Sec)	0	2	3	4	8
Service Time (sec)	3	3	5	2	3

(06 Marks)

c. Explain long, medium and short term scheduling in time sharing systems. **(06 Marks)**

Module-3

5 a. Explain contiguous memory allocation technique. **(08 Marks)**

b. Explain concept of paging. **(08 Marks)**

OR

6 a. Explain demand paging with diagram. **(08 Marks)**

b. Explain FIFO page replacement policy. **(08 Marks)**

Module-4

7 a. Explain with neat diagram file systems and IOCS. **(08 Marks)**

b. List and explain different file operations. **(08 Marks)**

OR

8 a. Explain with neat diagram Interface between file system and IOCS. **(08 Marks)**

b. Explain Allocation of disk space. **(08 Marks)**

Module-5

9 a. Explain message passing and issues related to it. **(08 Marks)**

b. Explain with diagram mailbox and its advantages. **(08 Marks)**

OR

10 a. Explain message passing implementation. **(08 Marks)**

b. Describe Resource stat modeling. **(08 Marks)**

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CBCS SCHEME

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15EC561

Fifth Semester B.E. Degree Examination, Aug./Sept. 2020
Automotive Electronics

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. With a schematic of the ignition circuit and primary current waveform. Explain the generation of spark pulse in a conventional automobile system. **(10 Marks)**

b. With relevant graphs analyze the effect of air-fuel ratio on the engine performance. **(06 Marks)**

OR

2 a. List the functions of a differential. With a neat diagram explain the working of disk brake system. **(10 Marks)**

b. Outline the desired functions of a catalytic converter. With a graphical representation analyze the effect of air-fuel ratio on the performance of a Three-way-catalytic converter. **(06 Marks)**

Module-2

3 a. With relevant diagrams, explain the working of an optical crankshaft position sensor. **(08 Marks)**

b. With a neat diagram, explain the working of an exhaust gas recirculation actuator. **(08 Marks)**

OR

4 a. What are the desirable characteristics of an EGO sensor? Draw and explain the switching characteristics of a typical EGO sensor. **(08 Marks)**

b. Explain the working of fuel injector and pulse mode fuel control signal with relevant diagrams and waveforms. **(08 Marks)**

Module-3

5 a. Briefly explain the different modes of fuel control. **(07 Marks)**

b. What are the various features of control unit software? Explain them briefly. **(09 Marks)**

OR

6 a. With a relevant diagram, explain how the spark advance is calculated in a distributorless ignition system. **(07 Marks)**

b. Draw a general block diagram of the control unit hardware and explain its different functional modules. **(09 Marks)**

Module-4

7 a. With diagrams, explain two types of gateway structures for the coupling of networks. **(08 Marks)**

b. Explain digital cruise control system with the help of a relevant diagram. **(08 Marks)**

OR

8 a. With a diagram, briefly explain the CAN protocol layers. Write the CAN message format. **(08 Marks)**

b. With a neat diagram, explain the working of a vacuum operated throttle actuator. **(08 Marks)**

Module-5

9 a. Write brief notes on On-Board-Diagnostics and Off-Board-Diagnostic systems. **(08 Marks)**

b. With the help of a relevant diagram, explain low tire pressure warning system. **(08 Marks)**

OR

10 a. With a block diagram, explain the timing light used to measure and set the ignition timing. **(08 Marks)**

b. With a relevant block diagram, explain the concept of platooning in automatic driving control system **(08 Marks)**

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CBCS SCHEME

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

15EC63

Sixth Semester B.E. Degree Examination, Aug./Sept. 2020
VLSI Design

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Explain the ideal I.V characteristics of nMOS transistor. Derive the equation for I_{DS} in three region i) cut off region ii) non–saturated region iii) saturation region. **(10 Marks)**

b. Explain the nMOS fabrication with neat diagram. **(06 Marks)**

OR

2 a. Explain the CMOS inverter transfer characteristics highlighting the regions of operations of the MOS transistor. **(06 Marks)**

b. Describe with heat sketches the fabrication of P-well CMOS inverter. **(06 Marks)**

c. Compare CMOS and bipolar technology. **(04 Marks)**

Module-2

3 a. Draw the circuit schematic and stick diagram of CMOS 2 input NAND gate. **(08 Marks)**

b. Explain briefly λ-based design rules for wire and transistor (nMOS, PMOS, CMOS). **(08 Marks)**

OR

4 a. Explain with diagram rise time model and fall time model of CMOS inverter. **(06 Marks)**

b. Explain briefly the circuit of inverting and non-inverting super buffer. **(06 Marks)**

c. Explain delay unit τ. **(04 Marks)**

Module-3

5 a. What are the most commonly used scaling models? Provide scaling factor for :
i) Power dissipasen per gate ii) Current density
iii) Channel resistance Ron iv) Parasitic capacitance C_x. **(06 Marks)**

b. What are the general considerations to be followed in designing a sub system? **(05 Marks)**

c. Explain the design steps for 4-bit adder. **(05 Marks)**

OR

6 a. Design regularity. **(04 Marks)**

b. Design 4 bit ALU to implement addition subtraction, EX-OR, EX-NOR and AND operation. **(12 Marks)**

Module-4

7 a. Discuss the architectural issue related to sub system design. **(06 Marks)**

b. Explain briefly a parity generator with block diagram and stick diagram. **(06 Marks)**

c. Give the comparison of SSRAM and antifuse FPGA. **(04 Marks)**

OR

8 a. Explain with schematic view of flash based FPGA. **(05 Marks)**

b. Explain briefly switch logic implementing of a four way multiplexer. **(07 Marks)**

c. What are the advantages of FPGA? **(04 Marks)**

Module-5

9 a. Explain the three transistor dynamic RAM – cell. **(08 Marks)**

b. Explain briefly nMOS Pseudo static memory cell. **(08 Marks)**

OR

10 a. Explain briefly logic verification principle. **(08 Marks)**

b. Write a short note on : i) Built In Self Test (BIST) ii) Scan Design Technology. **(08 Marks)**

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