

Reg. No.

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B.E. / B.TECH. DEGREE EXAMINATION, MAY 2023

Third Semester

IT18303 – INFORMATION AND CODING THEORY*(Information Technology)***(Regulation 2018A)****TIME: 3 HOURS****MAX. MARKS: 100**

CO1	Calculate Entropy, mutual information and channel capacity for various channels	4
CO2	Demonstrate different encoding and decoding of digital data streams	4
CO3	Evaluate various methods of generating and detecting different types of error correcting codes	5
CO4	Identify different compression and decompression techniques	4
CO5	Evaluate the performance of digital communication system by evaluating the probability of error for different error	5

PART- A(10x2=20Marks)

(Answer all Questions)

	CO	RBT LEVEL
1. Construct prefix codes for the symbols {s ₀ , s ₁ , s ₂ , s ₃ } with probabilities {0.4, 0.25, 0.2, 0.15}.	1	3
2. State the channel coding theorem.	1	1
3. Distinguish between flat top sampling and natural sampling.	2	3
4. State the significance of low pass filter.	2	1
5. List the objectives of good error control coding scheme.	3	3
6. Analyse whether the given block code is a linear block code {00000,11111}	3	4
7. Encode the following data using run length encoding technique. 11100000100111100001111111111111000000	4	3
8. Distinguish between GIF and TIFF.	4	3
9. Summarize when Temporal masking should be done in audio coding.	5	5
10. List out the different frames to be identified in video compression.	5	3

PART- B (5x 14=70Marks)

	Marks	CO	RBT LEVEL
11. (a) Consider the symbols w,e,n,t,# with probabilities 0.3,0.3,0.2,0.1 and 0.1 using huffmann coding. Encode the message went# by considering the newly formed probability as low as possible.	(14)	1	4

(OR)

- (b) Consider the probability transition matrix
 $P = \begin{matrix} & 1 & 2 \\ 1 & 1/4 & 1/4 \\ 2 & 1/2 & 3/8 \end{matrix}$

Find the channel capacity of binary symmetric channel with the above transition matrix. Assume $p(x_1) = p(x_2) = 1/2$.

12. (a) Explain one bit differential pulse code modulation with necessary diagrams. (14) 2 2
(OR)

- (b) Distinguish between adaptive dpcm and adaptive delta modulation. (14) 2 2

13. (a) Consider a (7,4) cyclic code using the generator polynomial $g(x) = x^3 + x + 1$. (14) 3 4
 Find the error correcting capabilities of this code? For the received word 1101100, determine the transmitted codeword using syndrome decoding method.

(OR)

- (b) Consider a convolutional code with a constraint length $K = 3$ and generator sequence $g(1) = (110)$, $g(2) = (101)$ and $g(3) = (111)$. (14) 3 4

(i) Draw the encoder block diagram.

(ii) Find the code word corresponding to the information sequence 11101 using time domain approach.

(iii) Find the codeword corresponding to the information sequence 100001 using transform domain approach.

14. (a) Consider the symbols $X = \{E, W, S, N\}$ with probabilities $\{0.3, 0.3, 0.2, 0.2\}$. (14) 4 3
 Apply Arithmetic Coding encode the message "NEWS".

(OR)

- (b) Explain the encoder and decoder principle of baseline JPEG. (14) 4 3

15. (a) Assess the encoder and decoder principle of MPEG audio encoder. (14) 5 3
(OR)

- (b) Assess how motion estimation and motion compensation are done in video compression with necessary diagrams? (14) 5 3

PART- C (1x 10=10Marks)

(Q.No.16 is compulsory)

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|-----|---|-------|----|-----------|
| 16. | Encode the text "EFFICIENCY" using Adaptive Huffman coding. | (10) | 4 | 4 |