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**B.E. / B.TECH. DEGREE EXAMINATIONS, DEC 2019**

Third Semester

**IT18303 – INFORMATION AND CODING THEORY***(Information Technology)***(Regulation 2018)****Time: Three Hours****Maximum : 100 Marks**Answer **ALL** questions**PART A - (10 X 2 = 20 Marks)**

	<b>CO</b>	<b>RBT</b>
1. Prove that the entropy of equally probable symbols is $\log_2 k$ , where $k$ is the number of symbols.	1	AN
2. State Source Coding Theorem.	1	R
3. What is Modulation?	2	U
4. State the significance of coding speech at low bit rates.	2	U
5. State the properties of Linear Block Codes.	3	R
6. How many errors can a (8,4) linear block code can detect?	3	AP
7. State the difference between static and dynamic huffman coding.	1	R
8. Give the applications of GIF.	4	U
9. What is frequency masking?	4	U
10. Find the GOP for the following set of frames. IBBPBBPBBIPPBPPBPPBBIPPPBBBPPBPPBPPI	4	U

**PART B - (5 X16 = 80 Marks)**

11. (a) A DMS has 5 symbols  $\{s_0, s_1, s_2, s_3, s_4\}$  characterised by probability distribution as  $\{0.4, 0.2, 0.1, 0.2, 0.1\}$  respectively. Generate the codewords for the above symbols using Huffman level 2 and level 3 coding. Find out which coding method is more suitable with respect to their coding efficiencies. **(16)**

**(OR)**

- (b) Consider a channel that has input symbols  $\{x_0, x_1, x_2\}$  with probabilities  $\{0.6, 0.1, 0.3\}$ . The channel is modeled by the probability transition matrix given by **(16)**

$$P = \begin{matrix} & \begin{matrix} 0.2 & 0.3 & 0.5 \end{matrix} \\ \begin{matrix} 0.6 & 0.2 & 0.2 \\ 0.1 & 0.8 & 0.1 \end{matrix} & \end{matrix}$$

Determine  $H(X)$ ,  $H(Y)$ ,  $H(Y|X)$ ,  $H(X|Y)$ ,  $H(X,Y)$ ,  $H(Y,X)$ ,  $I(X,Y)$ ,  $I(Y,X)$ .

12. (a) Illustrate with necessary diagrams how a single-bit PCM code is used to achieve digital transmission of analog signals. (16) 2 AP

(OR)

- (b) Illustrate with necessary diagrams, how speech waveform are encoded using Adaptive Differential Pulse Code Modulation. (16) 2 AP

13. (a) Consider (8,4) cyclic code with generator polynomial  $g(D)=1+D^3+D^4$  (16) 3 AP

- i. Form the generator matrix.
- ii. Find all possible code words.
- iii. Find the minimum distance among the code words.
- iv. Form the parity check matrix.

(OR)

- (b) Consider the rate 1/2 convolution encoder modeled by the generator polynomial  $g_1(D) = 1+D^2$  and  $g_2(D)=1+D+D^2$ . (16) 3 AP

- (i) Construct the trellis diagram.
- (ii) Decode the message 0100010000 using Viterbi algorithm.

14. (a) Encode the message “ **education** ” using adaptive Huffman coding. (16) 4 AP

(OR)

- (b) Identify the 5 main stages needed for coding baseline mode of operation in JPEG. Illustrate with necessary diagrams, the role of each stage. (16) 4 AP

15. (a) Illustrate with necessary diagrams, how speech signal are encoded using linear predictive coding so as to reduce the bandwidth requirement. (16) 4 AP

(OR)

- (b) Illustrate with necessary diagrams, how I,P and B frames of a video are encoded and stored in MPEG 4. (16) 4 AP