Total No. of Questions : 6]

SEAT No. : ____

P532

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TE/Insem/APR-120
T.E. (E & TC)
Information Theory, Coding and Communication Networks
(2015 Pattern)

Time :1 Hour] ***[Max. Marks : 30***

Instructions to the candidates:

1) ***Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume suitable data if necessary.***

Q1) a) A zero memory source emits seven symbols with probabilities (0.2, 0.15, 0.02, 0.1, 0.4, 0.08, 0.05). Compute coding efficiency, when above symbols are encoded by shanon fano source coding technique. **[6]**

b) List properties of mutual information. **[4]**

OR

Q2) a) Encode following symbols using Huffman source coding technique and calculate coding efficiency. **[8]**

$$\left[\frac{1}{4},\frac{1}{8},\frac{1}{16},\frac{1}{16},\frac{1}{16},\frac{1}{4},\frac{1}{16},\frac{1}{8}\right]$$

b) State objectives of source coding. **[2]**

Q3) a) Parity matrix of (7,4) LBC is as follows : **[6]**

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

Find the code word for the message

i) 0 1 0 1

ii) 1 0 1 0

b) Explain following terms with reference to Linear Block Code. **[4]**

i) Hamming Weight

ii) Hamming Distance

OR

P.T.O.

Q4) a) Ideal communication system has SNR of 10 and Band width of 1 MHz. **[6]**

Find channel capacity.

If SNR drops to 5, what will be new B.W. required for same capacity?

If B.W. drops to half, what will be new SNR for same capacity?

b) Explain the syndrome decoding operation for (n,k) block code with the help of diagram. **[4]**

Q5) a) Find all elements of GF(8) with primitive polynomial x^3+x+1 and hence compute minimal polynomial for $\alpha^2+\alpha+1$. **[6]**

b) Draw hardware arrangement for (7,4) cyclic encoder using $g(x) = 1+x^2+x^3$. **[4]**

OR

Q6) a) By using polynomial division method, obtain code vectors for d = [10 10]. Assume generating polynomial $g(x) = 1+x^2+x^3$. **[6]**

b) Explain Following terms : **[4]**

i) Galois Field

ii) Primitive Element