Total No. of Questions : 6]

SEAT No. :

P521

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APR - 18/TE/Insem. - 121
T.E. (E & TC Engineering)
INFORMATION THEORY, CODING & COMPUTER NETWORKS
(2015 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Figures to the right indicate full marks.***
3) ***Neat diagrams must be drawn whenever necessary.***

Q1) a) A DMC having channel transition matrix as, $\begin{bmatrix} 0.6 & 0.4 \\ 0.4 & 0.6 \end{bmatrix}$ emits equiprobable messages X_1 & X_2. Draw channel diagram & find H(X), H(Y), H(X, Y), H(X/Y), I(X, Y). Comment on type of channel. **[6]**

b) List various source coding techniques. Explain need of source coding with example. **[4]**

OR

Q2) a) A zero memory source emits 6 symbols (N, I, R, K, A, T) with probabilities (0.3, 0.1, 0.02, 0.15, 0.4, 0.03) respectively. Find : **[6]**

i) entropy of source.

ii) determine Shannon Fano code.

b) Define entropy & mutual information. **[4]**

Q3) a) A voice grade telephone channel has a bandwidth of 3400 Hz. If the SNR on the channel is 30 dB. Calculate channel capacity. If the channel is to be used transmit 48000 bps of data, find Min. SNR needed. **[6]**

b) Explain linearity property of Linear Block code with example. **[4]**

OR

Q4) a) For a systematic LBC, the parity check bits are **[8]**

$C_1 = M_1 \oplus M_2 \oplus M_3$

$C_2 = M_2 \oplus M_3 \oplus M_4$

$C_3 = M_1 \oplus M_2 \oplus M_4$

Find

i) Generator matrix.

ii) Error detecting & correcting capabilities.

iii) Parity Check Matrix.

iv) Corrected codeword for received codeword [1101001].

b) State channel coding theorem. **[2]**

Q5) a) Draw encoder for cyclic code having generator polynomial $g(x) = 1 + x^2 + x^3$. Generate codeword for message [1011]. **[6]**

b) Define terms : **[4]**

i) Minimal polynomial.

ii) Generator polynomial.

OR

Q6) a) Find all elements of GF(8) with primitive polynomial & hence compute minimal polynomial for $\alpha^2 + \alpha + 1$. **[6]**

b) Draw cyclic code decoder for $g(x) = 1 + x + x^3$. **[4]**

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