Q. Code:196960

B.E./B.TECH. Degree Examination, December 2020

Semester - VI

IT16601 - Information and Coding Theory

(Regulation 2016)

Time: Three hours Maximum :80 Marks

Answer **ALL** questions

PART A - (8 X 2 = 16 marks)

1. Nyquist criterion supports in

   a) Transmission bandwidth can be increased

   b) Transmission bandwidth can be reduced

   c) Signal Transmission without ISI

   d) Both b) and c)

2. Redundancy is more related with

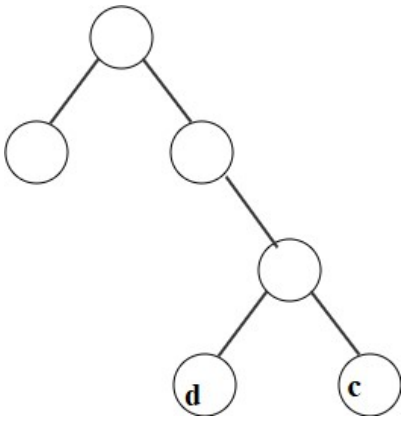
   a) Code rate

   b) Code size

   c) Minimum distance

   d) Code weight

3. Compute the Code for 'd'



   a. 011

   b. 111

   c. 101

   d. 110

4. Convolution encoder can be represented by

   a) Tree diagram

   b)Connection pictorial

   c) State diagram

   d) All of the mentioned

5. Illustrate the effect of frequency masking and temporal masking in audio coding.

6. Formulate the implications of channel capacity theorem.

7. Check whether the following code is a linear block code.

   C= { 0000,1100,0011,1111}.

8. How LPC reduces the bit rate?

PART B - (4 X16 = 64 marks)

09. (a) Consider the symbols {s0,s1,s2,s3,s4,s5,s6,s7} with probabilities {0.2, 0.2, 0.15, 0.15, 0.1, 0.1, 0.05,0.05} **(16)**

   i. Determine the huffmann code for the above symbols.

   Also find its efficiency.

(OR)

   (b) Formulate about binary erasure channel? Derive its channel capacity. **(16)**

10. (a) Encode the message "MISSISSIPPI" using dynamic huffmann coding technique. **(16)**

(OR)

   (b) Illustrate with suitable diagrams, the technique of baseline JPEG compression. Also draw the frame format used in JPEG **(16)**

11. (a) Consider a channel that has input symbols $\{x_0,x_1,x_2\}$ with probabilities {0.3,0.2,0.5} . The channel is modeled by the probability transition matrix given by **(16)**

$$P = \begin{matrix} 0.4 & 0.2 & 0.1 \\ 0.1 & 0.6 & 0.1 \\ 0.2 & 0.2 & 0.4 \end{matrix}$$

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

(OR)

   (b) Derive the channel capacity of different types of Discrete memory less channels. **(16)**

12. (a) 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)**

i. Draw the encoder circuit.

ii. Construct the code tree

Using trellis diagram encode the message 1101.

(OR)

(b) Illustrate RSA encryption algorithm with examples **(16)**