

PARUL UNIVERSITY
FACULTY OF ENGINEERING & TECHNOLOGY
M.Tech., Summer 2017-18 Examination

Semester: 2**Subject Code: 03204151****Subject Name: Information Theory & Coding****Date: 18/05/2018****Time: 2:00 pm to 4:30 pm****Total Marks: 60****Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1** A) Explain Shannon's Fundamental Theorem (05)
 B) Define entropy and discuss the conditions for maximum and minimum entropy. (05)
 C) Briefly explain public key encryption. (05)

- Q.2** Answer the following questions. (Attempt any three) (Each five mark) (15)
 A) Short note on Reed-Solomon codes.
 B) Short note on convolution codes.
 C) Explain Digital signature process.
 D) Explain RSA Algorithm with Example.

- Q.3** A) Find the generator matrix G for a systematic (7,4) cyclic code using the generator polynomial (07)
 $g(x) = x^3 + x^2 + 1$ and form the code.
 B) Draw the diagram of an encoder for systematic cyclic code and explain cyclic code generation in (08)
 detail. Also explain the decoding procedure.

OR

- B) Describe the procedure for encoding and decoding of linear block code. (08)

- Q.4** A) A binary channel matrix is given by (07)

$$\begin{array}{cc} & \mathbf{y1} & \mathbf{y2} \\ \mathbf{x1} & 2/3 & 1/3 \\ \mathbf{x2} & 1/3 & 2/3 \end{array} \quad \mathbf{x1, x2 = input, y1, y2 = output,}$$

$P_x(x1) = 1/2$ and $P_x(x2) = 1/2$. Determine $H(X)$ & $I(X;Y)$.

OR

- A) A source emits six messages with probabilities 0.3, 0.25, 0.15, 0.12, 0.1, 0.08 respectively. (07)
 I. Obtain the Huffman code.
 II. Find the average length of the code word.
 III. Determine the efficiency and the redundancy of the code.
 B) Derive the equation for channel capacity of a discrete memory less channel. (08)