DO-003-0496005   Seat No. _____

B. Sc. / M. Sc. (Applied Physics)
(Sem. VI) (CBCS) Examination
March / April - 2022
Digital Communication & Electronics : Paper - XXIII
(New Course)

Faculty Code : 003
Subject Code : 0496005

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

Instructions : (1) All questions are compulsory.
(2) Numbers in the right margin indicate marks.

1   Attempt any seven short questions : (two marks each)   14
   (1) Why we need to learn probability in digital communication ?
   (2) What is Entropy ?
   (3) Define Random Variable.
   (4) Define CDF.
   (5) Why digital communication is better ?
   (6) Why electromagnetic spectrum is needed to be studied before learning communication ?
   (7) List down drawbacks of analog communication.
   (8) Give two real time examples of digital communication technology uses in today's world.
   (9) Explain equally likely events.
   (10) Define Joint probability.

2   (a) Write answers of any **two** : (five marks each)   10
       (1) Write short note on Pulse Code Modulation Technique.
       (2) List different Properties of probability.
       (3) Vann Diagrams are used to indicate probability. Explain.
       (4) How and Why the Entropy of a message is measured ?
   (b) Write answer of any **one** :   4
       (1) Three coins are tossed at a time. Find the probability of
           (i) At least one Head
           (ii) Exact Two tails
       (2) Three cards are drawn in succession without replacement. Find the probability of all three are of different category.

3   (a)   Write answers of any **two** : (five marks each)   10
(1)   Discuss relationship between probability and information.
(2)   What is the use of Probability Distribution Function in communication ? Also explain with neat diagram PDF for rolling a dice.
(3)   Explain Cumulative Distribution Function for rolling two dice and getting sum of their top surfaces.
(4)   Explain Conditional Probability.
(b)   Write answer of any **one** :   4
(1)   Define and Explain the term Information.
(2)   Write and explain Bye's Rule.

4   (a)   Write answers of any **two** : (five marks each)   10
(1)   A discrete memoryless source has four message with probability
$P(x_1) = 0.4$
$P(x_2) = 0.3$
$P(x_3) = 0.2$
$P(x_4) = 0.1$
Using Shannon Fano coding technique, find the code for transmission.
(2)   For two mutually, exclusive messages, prove that the total amount of information conveyed is the sum of the information associated with each message individually.
(3)   Explain Quatization with neat sketch.
(4)   List Applications of digital communication.
(b)   Write answer of any **one** :   4
(1)   Explain Sampling with neat diagram.
(2)   Explain Delta Modulation.

5   (a)   Write answers of any **two** : (five marks each)   10
(1)   Explain Binary Symmetric Channel.
(2)   With Proper Diagram, explain frequency spectrum for communication.
(3)   Explain Channel Capacity.
(4)   Explain baseband and Broadband signals.
(b)   Write answer of any **one** :   4
(1)   A binary symmetric channel has two messages with probabilities 1/256 and 255/256. Find the entropy of the system. And discuss (from calculated entropy, if the system is good or bad.)
(2)   What is Dispersion ? Explain ISI.