Total No. of Questions – [3]   Total No. of Printed Pages: 2

G.R. No.	

paper code: U239-132(T1)

OCTOBER 2019 INSEM (T1)
S. Y. B.TECH. (Electronics and Telecommunication) (SEMESTER – III)
COURSE NAME: Probability & Statistics
COURSE CODE: ES21182ET
(PATTERN 2018)

Time: [1 Hour]   [Max. Marks: 20]

(*) Instructions to candidates:
1)   All questions are compulsory.
2)   Figures to the right indicate full marks.
3)   Use of scientific calculator is allowed.
4)   Assume suitable data where ever required.

Q 1)   Attempt any **one**
   a)

Suppose that a laboratory test to detect a certain disease has the following statistics.

Let   A = event that the tested person has the disease

B = event that the test result is positive

It is known that $P(B \mid A) = 0.99$ and $P(B \mid A^C) = 0.005$ and 0.1 percent of the population actually has the disease.

What is the probability that a person has the disease given that the test result is positive?

[4+ 4]

Consider the switching network shown in Fig. It is equally likely that a switch will or will not work. Find the probability that a closed path will exist between terminals a and b.
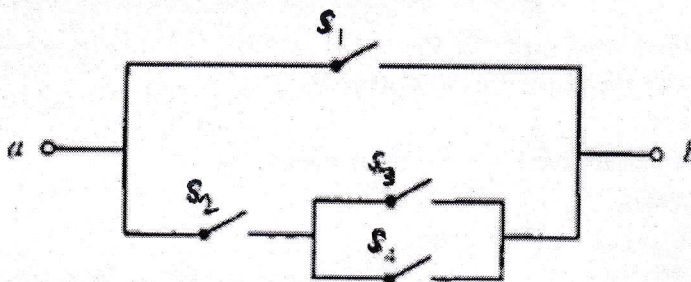
b)

A committee of 5 persons is to be selected randomly from a group of 5 men and 10 women.
(a) Find the probability that the committee consists of 2 men and 3 women.
(b) Find the probability that the committee consists of all women

[4+ 4]

Two numbers are chosen at random from among the numbers 1 to 10 without replacement. Find the probability that the second number chosen is 5.

Q 2) Attempt any **one**

a) The PDf of a random variable is given by   **[8]**
   $f(t) = C(81-t^2)$ for $0 \leq t \leq 9$

   find i) C   ii) CDF for this distribution   iii) P(t>3)   iv) P(t>7 | t>3)

b) A three digit message is transmitted over a noisy channel having a probability of error $P_{e = 1/3}$.

   Find i) PDF of this distribution   ii) CDF of this distribution
         iii) Mean   iv) Variance   **[8]**

Q 3) Attempt any **one**.

a) Consider an experiment of drawing randomly three balls from an urn containing two red, three white, and four blue balls. Let (X, Y) be a bivariate r.v. where X and Y denote, respectively, the number of red and white balls chosen.

   i)   Find the joint pmf's of (X, Y).   **[4]**
   ii)   Find the marginal pmf's of X and Y.

b) The joint pdf of a bivariate r.v. (X, Y) is given by
      $f_{xy}(x,y) = k(x+y)$ $0 < x < 2 , 0 < y < 2$
      $f_{xy}(x,y) = 0$ otherwise
   where k is a constant.

   i) Find the value of k.   **[4]**
   ii) Are X and Y independent?