END OF SEMESTER EXAM

Session of 23 to 26 February 2021
Course Tittle: Statistics and Probability

Duration : 2h   Level : II   SPECIALITY : GL et SR   ACADEMIC YEAR : 2020-2021

INSTRUCTIONS: ANSWER ALL QUESTION

Verification of concept (5marks)

1. A, B and C are three non-disjoint events. Establish a formula for the calculation of the probability of the union of these events (2.5mks)
2. State the conditions necessary for a probability density function to be a good density function. (1.5marks)
3. Distinguish between theoretical probability and experimental probability (1mark)

EXERCISE I (4marks)

a) A box contains 3 black balls, 2 red balls, and 5 orange balls. What is the probability of obtaining by a Bernoulli draw of 3 balls, for which 2 black balls, 1 red ball and zero orange ball   (1.5marks)

b) In IAI there are 3 doctors. Four students fall ill on the same day and each call a doctor by telephone after randomly choosing from the directory one of the three numbers, (each number for each doctor). What is the probability that the four patients each call the same Doctor?   (1.5mark)

c). Find the probability. of throwing 7 with two dice (1mk)

EXERCISE II (5marks)

a) From a group of 3 Indians, 4 Pakistanis, and 5 Americans, a sub-committee of four people is selected by lots. Find the probability that the sub-committee will consist of

   i)   2 Indians and 2 Pakistanis.   (1mk)
   ii)   1 Indians, 1 Pakistanis and 2 Americans.   (1mk)
   iii)   4 Americans   (1mk)

b) We throw two dices and we define a random variable X as the sum of points obtained from by from the two dices.

   i)   Determine the domain of definition of the random variable X   (0.5mark)
   ii)   Determine the probability law of X and do a graphical representation. (2mks)

EXEERCISE III (6 marks)

a) A coin is tossed twice: We give the following significance to event A and B

A: HEAD is obtain at least once

B: HEAD and TALE are obtained at least once each.

Is events A and B independent? Justify   (2mks)

b) Given that a continuous random variable which is absolutely continuous and defined on the interval $[0; 2]$ by the probability density function $f = \frac{x}{2}$

i) Verify that $f = (x)$ is a good probability density function on the considered interval.

ii) What is the repartition function for this variable

iii) Calculate E(X) and V(X)

iv) Calculate P (X=3) and $P(0.5 < X < 1.5)$ (4mks)

The end!!!!

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