BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSc   SEMESTER: V
BRANCH: PHY/CHEM/MATH   SESSION: MO/2022

SUBJECT: MA301 PROBABILITY AND STATISTICS

TIME: 2 HOURS   FULL MARKS: 25

INSTRUCTIONS:
1. The total marks of the questions are 25.
2. Candidates attempt for all 25 marks.
3. Before attempting the question paper, be sure that you have got the correct question paper.
4. The missing data, if any, may be assumed suitably.
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q1 (a)	Give an example of mutually exclusive outcomes which are not exhaustive. Also give an example of exhaustive outcomes which are not mutually exclusive.	[2]	1	1.11
Q1 (b)	A box contains n tickets marked 1, 2, 3…n. Two are chosen randomly without replacement. Find the probability that the numbers on the chosen tickets are consecutive integers.	[3]	1	1.25
Q2 (a)	Can the probability of a possible event be zero? Justify your answer.	[2]	1	1.12
Q2 (b)	A student is appearing at two tests, one in mathematics and the other in English. The probability for his passing the mathematics test is 2/3 and the probability of his passing both the tests is 14/45. The probability that he passes at least one of the two tests is 4/5. What is the probability that he will pass the English test?	[3]	1	1.25
Q3 (a)	Define independent events. Are mutually exclusive events independent or dependent? Justify your answer.	[2]	1	1.12
Q3 (b)	A problem is given to three students A, B and C whose respective chances of solving it are p, q and r. They all attempt to solve it independently and the problem is solved. Find the probability that only A could solve it.	[3]	1	1.25
Q4 (a)	"A random variable is a function of the outcome of a random experiment." Why are we interested in a function of this outcome rather than the outcome itself?	[2]	2	1.32
Q4 (b)	What do you mean by a probability distribution? For what value of K can the following be a probability distribution? Justify your answer. X: -2 -1 0 1 2 3 P(X=x): 0.1 K 0.2 2K 0.3 3K	[3]	3	1.20
Q5 (a)	Distinguish clearly between a discrete random variable and a continuous random variable.	[2]	2	1.24
Q5 (b)	A continuous random variable has the probability density function $f(x)=R(1+x)$, $2<x<5$ where R is some constant. Find $P(X<4)$.	[3]	3	1.25

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