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

CLASS: IMSc. **SEMESTER : I**
BRANCH: QEDS **SESSION : MO/2022**

SUBJECT: ED107 PROBABILITY - I

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	A college planning committee consists of 3 freshmen, 4 sophomores, 5 juniors and 2 seniors. A subcommittee of 4, consisting of 1 person from each class is to be chosen. How many different subcommittees are possible?	[5]	1	
Q.1(b)	Ten children are divided into an A team and a B team of 5 each. How many different divisions are possible?	[5]	1	
Q.2(a)	An insurance company believes that an accident-prone person will have an accident at some time within a fixed 1-year period with probability 0.4, whereas this probability decreases to 0.2 for a non-accident-prone person. If we assume that 30% of the population is accident-prone, what is the probability that a new policy holder will have accident within a year of purchasing policy?	[5]	2	
Q.2(b)	Suppose that a new policy holder has an accident within a year of purchasing a policy. What is the probability that he or she is accident prone?	[5]	2	
Q.3(a)	Three balls are chosen randomly from an urn containing 3 white, 3 red and 5 black balls. We win \$1 for each white ball selected and lose \$1 for each red ball selected. If X denote the total winnings from the experiment find the probability distribution of X.	[5]	3	
Q.3(b)	Find E(X) and V(X) where X is the outcome when we roll a fair die.	[5]	3	
Q.4(a)	The amount of time, in hours, that a computer functions before breaking down is a random variable with pdf $f(x) = \lambda e^{-x/100}$, $x > 0$, and 0, otherwise. What is the probability that a computer will function between 50 and 150 hours before breaking down?	[5]	4	
Q.4(b)	It will function less than 100 hours?	[5]	4	
Q.5	Suppose that 3 balls are randomly selected from an urn containing 3 red, 4 white, and 5 blue balls. If X and Y denote, respectively, the number of red and white balls chosen, find the joint probability mass function of X and Y. Check for the independence of the random variables.	[10]	5	

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