

Seat No. : _____

JI-103

June-2022

B.Sc., Sem.-II

103 : Statistics

(Probability Theory)

(New)

Time : 2 Hours]

[Max. Marks : 50

SECTION – I

Attempt any **Three** :

1. (A) Explain the following terms : 7
 - (1) Mutually exclusive events
 - (2) Union event
 - (3) Random experiment
 - (4) Difference event
- (B) A number is taken at random from the numbers 1 to 100. Find the probabilities that the number is divisible by (i) 3 (ii) 7 (iii) 3 or 7. 7

2. (A) State and prove Baye's theorem. 7
- (B) What is favourable cases ? Prove that $0 \leq P(A) \leq 1$. 7

3. (A) Write a definition of distribution function and write properties of it. 7
- (B) What is moment generating function ? Derive the moment generating function of random variable X with probability mass function $P(x) = 3(2)^{-2x}; x = 1, 2, 3, \dots$. 7

4. (A) Write the properties of Expectation of random variables. 7
- (B) Using probability generating function $G_x(t) = \frac{3}{4-t}$ find the mean and variance of X. 7
5. (A) State and prove Boole's inequality. 7
- (B) State and prove Bonferroni's inequality. 7
6. (A) State and prove Markov's inequality. 7
- (B) Explain concave function. 7
7. (A) Define joint probability mass function, joint probability density function, conditional expectation and conditional variance. 7
- (B) What is product moments ? Explain in detail. 7
8. (A) Explain marginal and conditional probability functions. And also prove that $E(X + Y) = E(X) + E(Y)$ where X and Y is a random variable with joint probability function $f(x, y)$. 7
- (B) For the joint probability distribution of two random variables X and Y are given below :

	Y			
X	1	2	3	4
1	4/36	3/36	2/36	1/36
2	1/36	3/36	3/36	2/36
3	5/36	1/36	1/36	1/36
4	1/36	2/36	1/36	5/36

Find

- (i) the marginal distribution of X and Y
- (ii) conditional distribution of X and Y
- (iii) conditional distribution of X given X.

- (6) Number of students in an examination is an example of _____ random variable.
- (a) discrete
 - (b) continuous
 - (c) Both of the above
 - (d) None of the above
- (7) Which of the following are mutually exclusive event when a single card is chosen at random from a standard deck of 52 playing cards ?
- (a) Choosing a 7 or choosing a club
 - (b) Choosing a 7 or choosing a jack
 - (c) Choosing a 7 or choosing a heart
 - (d) None of the above
- (8) The full form of CDF is
- (a) Cumulative Distribution Function
 - (b) Crime Density Function
 - (c) Creamy Distribution Function
 - (d) None of the above
- (9) If $\text{mean} < \text{median} < \text{mode}$ then it is _____ skewed distribution.
- (a) positive
 - (b) negative
 - (c) Both of the above
 - (d) None of the above
- (10) If the distribution is continuous then we use _____.
- (a) PMF
 - (b) PGF
 - (c) PDF
 - (d) None of the above