Programme	:	B. Tech.	Semester	:	Winter
Course Code & Course Title	:	BMAT202L (Probability and Statistics)	Slot	:	C1+TC1
Faculty	:	Dr Prabhakar V. Dr Harshavarthini S.	Class Number	:	CH2023240500894 CH2023240500895
Duration	:	90 Minutes	Max. Mark		50

General Instructions:
- Write only your registration number on the question paper in the box provided and do not write other information.
- Only non-programmable calculator without storage is permitted.

Answer all questions.

Q. No	Sub Sec.	Description	Marks
1.		Calculate the Median and Mode of the data given in the following table.	5+5

Class interval	9.5-14.5	14.5-19.5	19.5-24.5	24.5-29.5	29.5-34.5	34.5-39.5	39.5-44.5
Frequency	10	15	17	25	18	12	8

2.		The weekly salaries of a group of employees are given in the following table. Find the mean and standard deviation of the salaries.	10

Salary (In Rs.)	75	80	85	90	95	100
No. of persons	3	7	18	12	6	4

3. For the random variables X and Y, we define
$$p(x, y) = P(X = x, Y = y) = \begin{cases} k(x+y), & \text{for } x = 1, 2, 3, 4 \text{ and } y = 1, 2, 3 \\ 0, & \text{Otherwise} \end{cases}$$

Find **[10]**
- (i) the value(s) of k, such that $p(x, y)$ will be a joint PMF. **[2]**
- (ii) both the marginal PMFs. **[3]**
- (iii) both the conditional distributions. **[3]**
- (iv) $P(X + Y < 4)$ **[2]**

4. The joint probability density function (PDF) of the random variables X and Y is defined as:
$$f(x, y) = \begin{cases} k(6 - x - y), & \text{for } 0 < x < 2 \text{ and } 2 < y < 4 \\ 0, & \text{Otherwise} \end{cases}$$

Find **[10]**
- (i) the value(s) of k, such that $f(x, y)$ will be a joint PDF. **[2]**
- (ii) Justify whether X and Y are independent or not. **[5]**
- (iii) $P(X + Y < 3)$ **[3]**

5.	(a)	Suppose X is a discrete random variable and has the moment generating function (MGF) $M_X(t) = \frac{1}{5}e^t + \frac{2}{5}e^{3t} + \frac{2}{5}e^{6t}$. Hence find the corresponding probability mass function (PMF) of X. And also find the $E(X)$ by using the given MGF.	5
	(b)	Suppose Y is random variable with the probability density function $f_Y(y) = \begin{cases} \frac{1}{3}, & -1 < y < 2 \\ 0, & otherwise \end{cases}$. Find the cumulative distribution function (CDF) and the MGF.	2+3

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