End Semester Examination April/May 2019

Max. Marks: 60　　　　　　　　　　　　　Duration: 3 hrs

Class: FYMCA　　　　　　　　　　　　　Semester: II

Course Code: MCA 25　　　　　　　　　　Date: 11/05/2019

Subject: **Probability and Statistics**　　　Time: 2 - 5 pm

Instructions:　(1) All questions are compulsory.

　　　　　　　(2) Use of scientific calculator is allowed.

　　　　　　　(3) Assume any necessary data but justify the same.

Q.N		Marks	CO
1. (a)	The joint probability density function of the two dimensional random variable (X,Y) is given by $f(x,y)=\begin{cases} \dfrac{8}{9}xy, & 1\le x\le y\le 2 \\ 0, & otherwise \end{cases}$ (i) Find the marginal densities of X and Y. (ii) Find the conditional density function of Y given X=x, and the conditional density function of X given Y=y.	[10]	CO-2
(b)	Following data represents assets of a multinational company in crores of Rupees for the year 1995 to 2000. <table><tr><td>Year</td><td>1995</td><td>1996</td><td>1997</td><td>1998</td><td>1999</td><td>2000</td></tr><tr><td>Asset</td><td>83</td><td>92</td><td>71</td><td>90</td><td>110</td><td>115</td></tr></table> Find the regression of asset on year. Estimate the asset for the year 2002. Also find Karl Pearson's coefficient of correlation.	[10]	CO-2
2.	Prove with example that three events may be mutually independent but need not be pair-wise independent. **OR** Suppose that a product is produced in three factories X, Y and Z. It is known that factory X produces thrice as many items as factory Y, and that factories Y and Z produce the same number of items. Assume that it is known that 3% of the items produced by each of the factories X and Z are defective while 5% of those manufactured by factory Y are defective. All the items produced in the three factories are stocked, and an item of product is selected at random. What is the probability that this item is defective? If an item selected at random is found to be defective, what is the probability that it was produced by factory X, Y and Z respectively?	[10] [10]	CO-4 CO-4
3.	The lengths in cm of 10 nails produced by a certain machine are as: 5.10, 4.98, 5.03, 4.99, 5.00, 5.07, 5.04, 5.03, 4.91, 4.97. Can it be concluded that average length of a nail produce by the machine is 5cm. [Given: The value of t_α at 5% level of significance for 9 degrees of freedom is 1.833]	[10]	CO-3

	OR Mean and standard deviation of 100 items are 40 and 10. If at the time of calculation two items are wrongly taken as 30 and 72 instead of 3 and 27, find the correct mean and standard deviation.	[10]	CO-3
4	Prove that mean = mode = median for Normal distribution.	[10]	CO-6

	OR
	
	If the probability that an individual suffers a bad reaction from a certain injection is 0.001. Determine the probability that out of 2000 individuals.
	  (i) More than 4 individuals will suffer a bad reaction.
	  (ii) Less than 3 individuals will suffer a bad reaction.
	Use Poisson distribution.
		[10]	CO-6

5 (a)	From the following data on age of employees, calculate the Karl Pearson's coefficient of skewness.	[5]	CO-5

Age (years)	20-25	25-30	30-35	35-40	40-45	45-50	50-55
Number of employees	8	12	20	25	15	12	8

(b)	A man with n keys wants to open his door and tries the keys independently and at random. Find the mean and variance of the number of trials required to open the door if unsuccessful keys are eliminated from further selection.	[5]	CO-4

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