End Semester Examination April/May 2018	
Max. Marks: 100	Duration: 3 hrs
Class: FYMCA	Semester: II
Course Code: MCA 25	Date: 07 /05/2018
Subject: **Probability and Statistics**	Time: 02pm-05pm
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)	State and prove Baye's theorem. In the year 2017 there were three candidates for the position of principal, Mr. Chatterji, Mr. Iyangar and Mr. Wagh. Their chances of getting the appointment are in the proportion 4:2:3 respectively. The probability that Mr. Chatterji is selected would introduce computer education in the college is 0.3. the probability of Mr. Iyangar and Mr. Wagh doing the same are respectively 0.5 and 0.8. What is the probability that there was computer education in the college in 2018.	[10]	CO-4
	OR A prospective buyer tested the busting pressure of the sample of polythene bags received from a manufacturer. The test gives the following results.	[10]	CO-4

Bursting pressure (in lb.)	5-10	10-15	15-20	20-25	25-30	30-35
No of bags	2	10	30	50	6	2

Find Karl Pearson's coefficient of skewness, for bursting pressure.

(b)	The probability that a person will be alive in the next 10 years is 0.7 and the probability that his wife will be alive in the next 10 years is 0.6. Find the probability that: (i) at least one of them will be alive, (ii) both will be alive, (iii) only one of them will be alive for the next 10 years.	[10]	CO-4
2. (a)	The average height of 16 students is 170 cm with a standard deviation of 10 cm. Test at $\alpha=5\%$ whether the average height of the population is 172 cm. (Given: The value of t_α at 5% level of significance for 15 degrees of freedom is 2.131)	[10]	CO-3
	OR The following table gives the number of accidents in a city during a week. Find whether the accidents are uniformly distributed over a week.	[10]	CO-3

Day	Sun	Mon	Tue	Wed	Thu	Fri	Sat
No of accidents	10	8	11	9	12	10	10

(Given for 6 degrees of freedom at 5% level of significance, the table value of χ^2 is 12.59)

(b)	(i) Calculate the mean, median and mode for the following data: 16, 19, 27, 10, 5, 7, 12, 15	[5]	CO-2
	(ii) Let X be a discrete random variable with the following p.d.f. 	x	0	1	2	3
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P(x)	1/3	1/2	1/24	1/8	 Find E(Y) where $Y=(X-1)^2$	[5]	CO-2
3 (a)	(i) Two regression lines are given by the equations X+2Y-5=0 and 2X+3Y-8=0, $\sigma_x^2 = 12$. Find the values of $\overline{X}, \overline{Y}$ and σ_y^2. **OR** (ii) The joint distribution function (CDF) of X and Y is given by $$F_{XY}(x,y)=1-e^{-x}-e^{-y}+e^{-(x+y)} \qquad , \qquad x\geq0, \ y\geq0$$ $$=0, \qquad\qquad\qquad \text{otherwise}$$ Find the marginal density functions of X and Y. Are X and Y independent?	[10] [10]	CO-2 CO-2
(b)	The mean and standard deviation of 200 items are found to be 60 and 20 respectively. At the time of calculations two items were wrongly taken as 3 and 67 instead of 13 and 17. Find the correct mean and standard deviation.	[10]	CO-2

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(a)
	Prove than "mean=median=mode" for the normal distribution.
	
	OR
	
	Find the probability that 6<X<8 for each of the distributions:
	    (i) Uniform (4,16)
	    (ii) Exponential (1/4)
		[10]
		
		[10]
			CO-6
			
			CO-6

(b)	A random variable X has the following probability distribution function 	X.	0	1	2	3	4	5	6	7
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P(x)	0	K	2k	2k	3k	k^2	$2k^2$	$7k^2+k$ | Find k. If $P(X\leq c)>\dfrac{1}{2}$, find the minimum value of c.	[10]	CO-2
5 (a)	(i) The average marks scored by 32 boys are 72 with a standard deviation of 8 while for 36 girls is 70 with a standard deviation of 6. Did the boys perform better than the girls? (Z value for right tailed test and 1% level of significance is 2.33). (ii) Prove that Geometric distribution is memoryless.	[5] [5]	CO-3 CO-5
(b)	(i) A coin is tossed four times. Calculate the expectation value and variance of the number of heads obtained. (ii) Consider 4 computer firms A,B,C and D bidding for a contract. A survey of past bidding success of these firms on similar contract gives following probability of winning. P(A)=0.35, P(B)=0.15, P(C)=0.3, P(D)=0.2. Before discussion is made to avail a contract, the firm B withdraws its bid. Find the new probability of winning	[5] [5]	CO-4 CO-4