MCA Sem I. Choice Based.   Nov/Dec-2016
Sub:- Statistics & Probability.   21-12-16

Q.P. Code : 751002

(3 Hours)   Total Marks: 80

N.B. (1) Question No. 1 is compulsory.
     (2) Attempt any **THREE** out of remaining five questions.
     (3) Assume any necessary data but justify the same.
     (4) Figure to the right indicates marks.
     (5) Use of scientific calculator is allowed.

Q.1	a)	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.	[5]
	b)	In the frequency distribution of 100 families given below, the number of families corresponding to expenditure groups 20-40 and 60-80 are missing. The median is known to be 50. Find the missing frequencies.	[5]

Expenditure (in Rs.)	No. of Families
0-20	14
20-40	?
40-60	27
60-80	?
80-100	15

	c)	A box contains 36 tag numbered 1 to 36. One tag is drawn at random. Find the probability that the number on the tag is either divisible by 3 or is a perfect square.	[5]
	d)	If X is a discrete random variable, then prove that : i) $E(aX + b) = a E(X) + b$ ii) $V(aX + B) = a^2 V(X)$	[5]
Q.2	a)	If X and Y are two random variables having joint probability density function $f(x,y) = 2$; $0 < x < 1$, $0 < y < x$ $= 0$; otherwise i) Find the marginal density functions of X and Y. ii) Find conditional density function of Y given X and X given Y. iii) Check for independence of X and Y.	[10]
	b)	Calculate the Bowley's coefficient of skewness for the following distribution.	[5]

Class	05-10	10-15	15-20	20-25	25-30	30-35	35-40
Frequency	07	09	16	22	14	12	3

TURN OVER

	c)	Use the Stem and Leaf plot to answer following questions.	[5]

Stem	Leaf
6	1 1 4 6 7 8
7	2 3 5 7 9
8	1 3 5 6 6 7 7 8 9
9	0 0 3 4 6 8 9 9
10	0 0

i) What is the best test score?
ii) How many students took the test?
iii) How many students scored 90?
iv) What is the lowest score?
v) Find the difference between the high and low scores.

Q.3	a)	Ten competitors in a beauty contest are ranked by three judges in the following order.	[10]

Judge1	1	1	5	4	8	9	6	10	7	3	2
Judge2	2	4	8	7	6	5	9	10	3	2	1
Judge3	3	6	7	8	1	5	10	9	2	3	4

Use rank correlation coefficient to discuss which pair of judges has the nearest approach to beauty.

	b)	Let X be a discrete random variable with the following p.d.f.	[5]

X	0	1	2	3
P(X)	1/3	1\2	1\24	1\8

Find $E(Y)$ where $Y = (X - 1)^2$

	c)	The letters of the word "failure" are arranged at random. Find the probability that the consonants may occupy only odd position.	[5]

Q.4	a)	State and prove Baye's theorem and use it to determine the probabilities in the following example: In a bolt factory machines A, B, and C manufacture respectively 25%, 35% and 40% of total. Of their output 5, 4, 2, percent are defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it was manufactured by machines A, B,C ?	[10]
	b)	Show that whether A and B are independent, positively associated or negatively associated. $(AB) = 128$, $(\alpha B) = 384$, $(A\beta) = 24$, $(\alpha\beta) = 72$	[5]

TURN OVER

	c)	The following figures show the distribution of digits in number chosen at random from a telephone directory.		[5]

Digits	0	1	2	3	4	5	6	7	8	9
Freq.	1026	1107	997	966	1075	933	1107	972	964	853

Test whether the digits may be taken to occur equally frequently in the directory. (Given the table value of chi_square for 9 degrees of freedom at 5% level of significance is 16.92)

Q.5	a)	An analyst takes a random sample of 100 recent truck shipment made by a company and records the distance in miles and delivery time to the nearest half-day from the time that the shipment was made available for pick-up as given in the table below		[10]

Distance In miles (x)	852	215	1070	550	480	920	1350	325	670	1215
Delivery time in days (Y)	3.5	1	4	2	1	3	4.5	1.5	3	5

    i) Determine lines of Regression Y on X and X on Y
    ii) Find Karl Pearson's correlation coefficient
    iii) Estimate the delivery time in days for 1000 miles
    iv) Estimate the distance in miles for 2.5 days.

	b)	Find the quartile deviation for the following data:	[5]

Class Interval	0-15	15-30	30-45	45-60	60-75	75-90	90-105
Frequency	8	26	30	45	20	17	4

	c)	The probability that a person stopping at a petrol pump will ask for petrol is 0.8, will ask for water is 0.7 and for both is 0.65. find the probability that the person will ask for : i) either petrol or water ii) neither petrol nor water iii) only petrol	[5]
Q.6	a)	Draw Box and Whisker diagram for the following data set 3, 7, 7, 3, 10, 1, 6, 6	[5]
	b)	Test the consistency of the following data with the symbols having their usual meaning : N = 1000 , (A) = 600 , (B) = 500 , (AB) = 50	[5]
	c)	A machine is design to produce insulating washers for electric devices of average thickness of 0.025 cm. A random sample of 10 washers was found to have an average thickness of 0.024 cm. with a standard deviation of 0.002 cm. Test the significance of the deviation. Value of t for 9 degrees of freedom at 5% level is 2.262.	[5]

	d)	A continuous random variable has pdf
		
		    $f(x) = k(2-x)$, $0 \leq x < 2$
		        $= kx(x-2)$, $2 \leq x < 3$
		        $= 0$, otherwise
		
		Find k and median of the distribution.
			[5]

Q 3 (a) TABLE READ AS FOLLOW

Judge 1	1	5	4	8	9	6	10	7	3	2
Judge 2	4	8	7	6	5	9	10	3	2	1
Judge 3	6	7	8	1	5	10	9	2	3	4