



**Dayananda Sagar University**

**SCHOOL OF ENGINEERING**

Hosur Main Road, Kudlu Gate, Bangalore-560068

**Department of Computer Applications**

**4<sup>th</sup> Semester B.C. A.**

**INTERNAL ASSESSMENT TEST – II**

**Subject: 16CA106**

**Date: 01.04.19**

**Subject Code: Mathematics-2**

**Max. Marks: 50**

**Duration: 1 ½**

**hrs**

**Note:** 1. Answer any FIVE full questions.

2. Each question carries 10 Marks.

1 (A) Fit a Parabola for the following data

(6Points)

X: 0.0 1.0 2.0

Y: 1.0 6.0 17.0

(B) Define Normal Equations to fit a Straight line by the method of least Squares (4Points)

2 In a Correlation study the following values are obtained

(10 Points)

	X	Y
Mean	65	67
Standard deviation	2.5	3.5

Correlation Coefficient  $r = 0.8$  Find Regression line X on Y and Y on X.

3. (A) Distinguish between Simple, Multiple and Partial Correlation (6Points)

(B) Define Rank correlation

(4Points)

4. Calculate Pearson's Coefficient of correlation from the following data using mean of X and Y as 44 and 26

X: 43 44 46 40 44 42 45 42 38 40 42 57

Y: 29 31 19 18 19 27 27 29 41 30 26 10 (10Points)

5. The Ranks of the some 15 students in Two Subjects A and B given below .The two groups within the brackets denote the rank of A and B.

(1,10)(2,7) (3,2)(4,6)(5,4)(6,8)(7,3)(10,1)(9,11)(10,15)(11,9)(12,5)(13,14)(14,12)(15,13) (10Points)



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Find spearman's rank correlation coefficient.

6. (A)What are the uses of Regression analysis. (6Points)

(B)Calculate Correlation Coefficient by direct method (4Points)

X: 9 8 7 6 5 4 3 2 1

Y: 15 16 14 13 11 12 10 8 9



## II Semester B.C.A. Examinations – May 2019 / June 2019

Course Title: Mathematics – II

Course Code: 16CA106

Duration: 03 Hours

Date: 20-05-2019

Time: 10:00 AM to 01:00 PM

Max Marks: 60

- Note:
1. Answer 5 full questions choosing one from each Section
  2. Each Section carries 12 Marks
  3. Draw neat sketches wherever necessary
  4. Missing Data may be suitably assumed
  5. Use the Probability Distribution Table wherever necessary

### SECTION – 1

- 1.a. Given the two random variables  $X$  and  $Y$  that have the joint density

$$f(x,y) = \begin{cases} x.e^{-x(1+y)} & \text{for } x > 0 \text{ and } y > 0 \\ 0 & \text{elsewhere} \end{cases}$$

Find the regression equation of  $Y$  on  $X$ .

(06 Marks)

- 1.b. With reference to the data in table :

(06 Marks)

Hours $x$	4	9	10	14	4	7	12	22	1	17
Test $y$	31	58	65	73	37	44	60	91	21	84

- Find the equation of the least squares line that approximates the regression of the test scores on the number of hours studied;
- Predict the average test score of a person who studied 14 hours for the test.

### OR

- 2.a. Suppose that we want to determine on the basis of following data whether there is a relationship between the time, in minutes, it takes a secretary to complete a certain form in morning and in the late afternoon:

Morning $x$	8.2	9.6	7.0	9.4	10.9	7.1	9.0	6.6	8.4	10.5
Afternoon $y$	8.7	9.6	6.9	8.5	11.3	7.6	9.2	6.3	8.4	12.3

Compute correlation coefficient.

(06 Marks)

- 2.b. If the joint density of  $x_1, x_2, x_3$  is given by

$$f(x_1, x_2, x_3) = \begin{cases} (x_1 + x_2)e^{-x_3} & \text{for } 0 < x_1 < 1, 0 < x_2 < 1, x_3 > 0, \\ 0 & \text{elsewhere} \end{cases}$$

find the regression equation of  $x_2$  on  $x_1$  and  $x_3$ .

(06 Marks)

## SECTION - 2

- 3.a. Three students A, B, C write an entrance examination. Their chances of passing are  $\frac{1}{2}$ ,  $\frac{1}{3}$ , and  $\frac{1}{4}$  respectively. Find the probability that (06 Marks)
- (i) atleast one of them passes
  - (ii) all of them pass
  - (iii) atleast two of them pass
- 3.b. In a bolt factory there are four machines A, B, C, D manufacturing respectively 20%, 15%, 25%, 40% of the total production. Out of these 5%, 4%, 3%, 2% are defective. If a bolt drawn at random was found defective what is the probability that it was manufactured by A or D? (06 Marks)

OR

- 4.a. Suppose that A and B are mutually exclusive events for which  $P(A) = .3$  and  $P(B) = .5$ . (06 Marks)
- What is the probability that
- (i) either A or B occurs?
  - (ii) A occur but B does not?
  - (iii) both A and B occur?
- 4.b. A company is manufacturing ball pens in two writing colors blue and red make packets of 10 pens with 5 pens of each color. In a particular shop it was found that after sales, packet one contained 3 blue and 2 red pens, packet two contained 2 blue and 3 red pens, packet 3 contained 3 blue and 5 red pens. On the demand of a customer for a pen, the packet was drawn at random and a pen was taken out. It was found blue. Find the probability that packet one was selected. (06 Marks)

## SECTION - 3

- 5.a. Suppose that 100 high performances tires made by a certain manufacturer lasted on the average 21,819 miles with a standard deviation of 1,295 miles. Test the null hypothesis  $\mu = 22,000$  miles against the alternative hypothesis  $\mu < 22,000$  miles at the 0.05 level of significance. (06 Marks)
- 5.b. In comparing the variability of the tensile strength of two kinds of structural steel, an experiment yielded the following results:  $n_1 = 13, s_1^2 = 19.2, n_2 = 16, s_2^2 = 3.5$ , where the units of measurement are 1,000 pounds per square inch. Assuming that the measurement constitute independent random samples from two normal populations, test the null hypothesis  $\sigma_1^2 = \sigma_2^2$  against the alternatives  $\sigma_1^2 \neq \sigma_2^2$  at the 0.02 level of significance. (06 Marks)

OR

- 6.a. The specification for a certain kind of ribbon call for a mean breaking strength of 185 pounds. If five pieces randomly selected from different rlls have breaking strengths of 171.6, 191.8, 178.3, 184.9 and 189.1 pounds, test the null hypothesis  $\mu = 185$  pounds against the alternative hypothesis  $\mu < 185$  pounds at the 0.05 level of significance.

(06 Marks)

- 6.b. Five measurements of the tar content of a certain kind of cigarette yielded 14.5, 14.2, 14.4, 14.3 and 14.6 mg/cigarette. Assuming that the data are a random sample from a normal population, use the four steps to show that at the 0.05 level of significance the null hypothesis  $\mu = 14.0$  must be rejected in favor of alternative  $\mu \neq 14.0$ .

(06 Marks)

#### SECTION - 4

- 7.a. As part of the investigation of the collapse of the roof of a building, a testing laboratory is given all the available bolts that connected the steel structure at 3 different positions on the roof. The force required to shear each of these bolts (coded values) are as follows:

Position 1	90	82	79	98	83	91	
Position 2	105	89	93	104	89	95	86
Position 3	83	89	80	94			

Perform an analysis of variance to test at the 0.05 level of significance whether the difference among the sample means at the 3 positions are significant.

(06 Marks)

- 7.b. The following are the weight losses of certain machine parts (in milligrams) due to friction when 3 different lubricants were used under controlled conditions:

(06 Marks)

Lubricant A	12.2	11.8	13.1	11.0	3.9	4.1	10.3	8.4
Lubricant B	10.9	5.7	13.5	9.4	11.4	15.7	10.8	14.0
Lubricant C	12.7	19.9	13.6	11.7	18.3	14.3	22.8	20.4

- (i) Test the 0.01 level of significance whether the differences among the means can be attributed to chance.
- (ii) Estimate the parameter of the model used in analysis of this experiment.

#### OR

- 8.a. The internal bonding strengths of 3 different resins ED, MD and PF, need to be compared. Five specimens were prepared for each of the resins:

Resin	Strength					Mean
ED	0.99	1.19	0.79	0.95	0.90	0.964
MD	1.11	1.53	1.37	1.24	1.42	1.334
PF	0.83	0.68	0.94	0.86	0.57	0.776

Perform an analysis of variance table.

(06 Marks)



- 8.b. To find the best arrangement of instruments on a control panel of an airplane, 3 different arrangements were tested by simulating an emergency condition and observing the reaction time required to correct the condition. The reaction times of 28 pilots were as follows:

Arrangement 1	14	13	9	15	11	13	14	11				
Arrangement 2	10	12	9	7	11	8	12	9	10	13	9	10
Arrangement 3	11	5	9	10	6	8	8	7				

Test at the level of significance  $\alpha = 0.01$  whether we can reject the null hypothesis that the differences among the arrangements have no effect.

(06 Marks)

### SECTION - 5

- 9.a. If random variable  $X$  take the value 1,2,3,4 such that  $2P\{X=1\} = 3P\{X=2\} = P\{X=3\} = 5P\{X=4\}$ , find the probability distribution function of  $X$ .

(04 Marks)

- 9.b. Find  $k$  such that

$$f(x) = \begin{cases} kx^2 & 0 < x < 3, \\ 0 & \text{otherwise.} \end{cases}$$

is a probability density function. Also compute (i)  $P\{1 < X < 2\}$ ; (ii)  $P\{X \leq 1\}$

(04 Marks)

- 9.c. A lot contains 1% of defective items. What should be the number ( $n$ ) of items in a random sample following binomial distribution so that the probability of finding at least one defective in it is at least 0.75?

(04 Marks)

OR

- 10.a. A random variable  $X$  take the values -3, -2, -1, 0, 1, 2, 3 such that  $P\{X=0\} = P\{X < 0\}$  and  $P\{X=-3\} = P\{X=-2\} = P\{X=-1\} = P\{X=1\} = P\{X=2\} = P\{X=3\}$ . Find the probability distribution.

(04 Marks)

- 10.b. The number of telephone lines busy at an instant of time is a binomial variate with probability 0.1 that a line is busy. If 10 lines are chosen at random, what is the probability that

(04 Marks)

- (i) all lines are busy (ii) no lines are busy  
(iii) atleast one is busy (iv) atmost two lines are busy

- 10.c. If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals, more than two will get a bad reaction.

(04 Marks)