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Shree Damodar College of Commerce & Economics, Margao, Goa
S.Y.BCOM, Semester IV, Semester End Examination – April 2018
STATISTICAL TECHNIQUES

Duration: 2 hours

Max. Marks: 80

- Instructions:** 1) All question are compulsory (choice is internal)
2) Start each new question on a fresh page
3) Figures to the right indicate full marks
4) Use of non-programmable calculators allowed
5) Graph paper will be issued on request

Q.1 Attempt the following:

- a) Explain the concept of regression and define regression coefficients (3)
- b) Six coins tossed simultaneously what is the probability of getting (6)
 - i. 2 heads
 - ii. Atleast 2 heads
 - iii. Atmost 2 heads
- c) 60% of persons staying in a building read "Express", 50% read "Times" while 30% of them read both. Find the probability that a randomly chosen person staying in the building reads atleast one of the two (7)

OR

Q.I Attempt the following:

- w) Define coefficient of correlation and distinguish between positive and negative correlation.(3)
- d) The watches produced by a certain company include only one defective watch in every 500 watches. 5 packets of 25 watches each are considered. Find the probability that in 5 packets there is: (6)
 - i. No defective
 - ii. One defective ($e^{-0.25} = 0.7788, e^{-0.4} = 0.6703e^{-2.5} = 0.0821$)
- z) A bag contains 4 white and 5 black balls. Two balls are drawn at random without replacement from the bag. What is the probability that both of them are white? What is the probability that one is white and other is black? (7)

Q.2 Attempt the following:

- a) Define i) Trial and Event
ii) Mutually exclusive event (3)
- b) For the following data calculate Karl Pearson coefficient of correlation . (6)

x	10	12	15	17	19	7
y	12	15	16	18	24	42

- c) The following data refer to the no. of defectives in 10 samples of 100 items each. Construct an appropriate control chart and state your conclusion.: (7)

Sample No.	1	2	3	4	5	6	7	8	9	10
No. of defectives	4	8	11	3	11	7	7	16	12	6

OR

Q.II Attempt the following:

- x) State and prove the multiplication theorem. (3)
- y) The coefficient of rank correlation of marks obtained by 9 students was calculated to be 0.4. It was later discovered that the value of the difference between the ranks for one student was written wrongly as 6 instead of 8. Find the correct value of coefficient of rank correlation. (6)

- z) The no. of defects in 20 pieces of cloth each of 100 meters length is given below. Draw appropriate chart and say whether the process can be considered to be in control. (7)
- 1,3,3,1,6,4,3,7,10,2,2,6,4,3,2,7,1,5,6,4

Q.3 Attempt the following:

- a) Define multi stage sampling and purposive sampling (3)
- b) The coefficient of correlation between two variables x and y is 0.8, $\bar{x} = 11$, $\bar{y} = 20$ and the regression coefficient of y on x is 1.6. Find regression coefficient of x on y and the two regression equations. (6)
- c) i) Twenty four students out of a post graduate class of forty nine wear spectacles. Does it confirm the hypothesis that about thirty six percent of the students population studying for a post graduate degree suffer from short sight. Use 5% level of significance.
- (4)ii) In a large consignment of oranges a random sample of 400 oranges revealed that 52 oranges were bad. Find the 95% confidence limits for the defective oranges in the whole consignment. (3)

OR

Q.III Attempt the following:

- x) Define census and sample survey and discuss the relative merits of each (3)
- y) Find the mean values of x and y and coefficient of correlation for the given data: (6)
- $$20y - 9x - 120 = 0, \text{ and } 25y - 20x + 25 = 0$$
- z) A sample of 600 persons selected randomly from a large city gives the results that males are 53%. Is there a reason to doubt the hypothesis that males and females are in equal no. in the city. Also find the 99% of confidence limits for the population proportion. (7)

Q.4 Attempt the following:

- a) Define Binomial distribution. State the physical conditions under which it is used. (3)
- b) Find the 2 regression equation for the following data. (6)
- $$\sum x = 30, \sum y = 180, \sum xy = 1000, \sum x^2 = 200, \sum y^2 = 5642, n = 6$$
- c) Eight samples of size 5 each are drawn at regular intervals from a manufacturing process. The relevant data are given below. ($A_2 = 0.58$) (7)

Sample no.	1	2	3	4	5	6	7	8
Mean (\bar{X})	49	48	45	53	39	47	39	50
Range(R)	5	6	5	7	7	4	8	6

Construct the control chart for mean and comment.

OR

Q.IV Attempt the following:

- x) Explain the general characteristics of Poisson distribution. (3)
- y) Given the bivariate data. (6)

X:	1	5	3	2	7	6
Y:	6	1	0	4	2	5

Obtain 1) Both the regression lines

2) The correlation coefficient Γ using regression coefficient

- z) Construct a control chart for range for the following data of 10 samples containing 5 items each. (7)
- ($D_3 = 0$, $D_4 = 2.115$ for sample of size $n=5$)

Sample no.	1	2	3	4	5	6	7	8	9	10
Sample range: \bar{R}	7	5	7	9	5	8	8	6	7	6

Q.5 Attempt the following:

- a) Differentiate between point estimate and interval estimate. (3)
- b) The company claims that 90% of the refrigerators produced are not defective. A sample of 6 refrigerators is chosen at random. What is the probability that:
- There are no defective refrigerators.
 - Atleast one piece is defective. (6)
- c) i) A coin is tossed twice, if it shows the same output twice, you will get Rs. 100 otherwise you will lose Rs. 50. What is your mathematical expectation? (4)
- ii) Find the coefficient of correlation for the following given data:
- $\sum x = 20, \sum y = 11.58, \sum x^2 = 90, \sum y^2 = 27.03, \sum xy = 47.13, n = 5$ (3)

OR

Q.V Attempt the following:

- x) Define 1) null hypothesis 2) Alternate hypothesis. (3)
- y) The marks scored by 1000 candidate in a certain test are normally distributed with mean 500 and S.D. 100
- How many candidate have scores less than 400?
 - What % of candidate have scores between 500 and 600. (6)
- (Given area under the curve between $t = 0$ and $t = 1$ is 0.3413)
- z) i) The probability that a man fishing at a particular place will catch 1, 2, 3, 4 fish are 0.4, 0.3, 0.2, and 0.1 respectively. What is the expectation no. of fish caught? (3)
- ii) Coefficient of correlation is 0.8, Standard deviation of x is 4 and standard deviation of y is 9. (4)
- Compute both the regression coefficients
