

Vidya Vikas Mandal's
Shree Damodar College of Commerce & Economics, Margao, Goa
SYBCOM, Semester IV, MAY/JUNE SUPPLEMENTARY EXAMINATION 2018
STATISTICAL TECHNIQUES-II

Duration: 2 hours

Max. Marks: 80

Instructions:

1. All questions are compulsory.
2. Start each new question on a fresh page.
3. Figures to the right indicate full marks
4. Graph paper will be provided on request.
5. Use of calculators is allowed.

Q.1 a What is regression? Why are there in general two regression lines? Under what conditions can there be only one line. 3

b Find Karl Pearson's coefficient of correlation for the following data. 6

Income (x)	18	15	16	19	12	4	6
Expenditure (y)	14	12	18	21	13	5	9

c If the two regression lines for a bivariate data are $2x=y+15$ and $4y=3x+25$, find: 7

1. Mean of x and y
2. Regression coefficient i.e. b_{xy} and b_{yx}
3. Correlation coefficient 'r'.

Or

QI x Explain the meaning of Correlation. 3

y The following are ranks given by 2 judges A and B. Tell whether their opinions are more/less the same or different. 6

Rank by A	1	2	3	4	5	6	7	8
Rank by B	4	5	6	7	8	2	3	1

z Find the regression equation of y on x 7

x	3	5	7	9	11
y	9	12	16	14	15

Q.2 a Differentiate the following pairs of concepts. 3

1. Statistic and Parameter.
2. Point estimate and interval estimate.

b Coefficient of correlation between x and y for 20 items is 0.3; mean of x is 15 and that of y is 20, standard deviations are 4 and 5 respectively. At the time of calculations one pair (x=27, y=30) was wrongly taken as (x=17, y=35). Find the correct coefficient of correlation. 6

- c The following table indicates the results obtained from an inspection of equipment (product line). Work out the control limits and draw the c-chart for the same. Also comment on the state of control. 7

Product No.	1	2	3	4	5	6	7	8	9	10
Product defects (number)	5	3	6	3	3	4	3	5	4	4

Or

- Q.II x Define the term Hypothesis, Type I and Type II error. 3

- y Following data gives the number of officers on duty and the waiting time for customers. Find the regression line of waiting time on the number of officers on duty. How long will customers have to wait if there are 6 officers on duty on a particular day? 6

No. of officers	3	4	5	3	4
Waiting time in mins	12	7	5	11	8

- z A consignment is inspected by the Quality control team, as the material is brought in by the vendor to the warehouse. The results are given in the table below (there are samples of 100 items chosen every time the inspection is carried out). Draw p-chart, with identification of any out of control lot (beyond the acceptable limit). 7

Lot No.	1	2	3	4	5	6	7	8	9	10	11	12
No. of defectives	10	12	15	10	12	11	12	13	14	20	15	17

- Q.3 a Distinguish between Positive and Negative Correlation. 3

- b It is observed that 2% of bulbs made by a factory are defective. Find probability that in a sample of 200 bulbs, (a) less than 2 bulbs (b) more than 3 bulbs are defective (given $e^{-1}=0.3679$, $e^{-4}=0.0183$). 6

- c The mean breaking strength of cables supplied by a manufacturer is 1800 with standard deviation 100. A random sample shows mean breaking strength as 1850. Can it be regarded that the sample has been drawn from the population (the sample size being 50). Also set up 95% confidence limits of the mean breaking strength of cables. 7

Or

- Q.III x What is a scatter diagram? Indicate by means of suitable scatter diagrams different types of correlation that may exist between the variables in bivariate data. 3

- y A die is thrown three times. Getting a '3' or a '6' is considered a success. Find the probability of at least two successes. 6

- z 1. From a certain process, it was concluded that on the average, there are 15 percent defectives. The new material purchased was used in the 4

process and it was noticed that out of a total output of 400 units 48 were found to be defective. Would you accept the new material.(at 5% level of significance).

2. Find the 95% confidence limit for a population mean, if the mean is 60, standard deviation is 2 and n is 64. 3

OR

- Q.4 a What is systematic random sampling? 3

- b In a Pizza Hut, the following distribution is found for the daily demand of pizzas. Find the expected daily demand and also the variance. 6

No. of Pizzas	5	6	7	8	9	10
Probability	0.07	0.2	0.3	0.3	0.07	0.06

- c A factory produces electric bulbs on a large scale with average life of 1500 hrs. and standard deviation of 150 hrs. In a lot of 3000 bulbs, how many bulbs are likely to have life? 7

1. Of less than 1100hrs.
2. More than 1850 hrs.
3. Between 1100 hrs and 1700 hrs?

Given $P(0 < z < 1.33) = 0.4082$, $P(0 < z < 2.33) = 0.4901$ and

$P(0 < z < 2.67) = 0.4962$; where z is standard normal variate.

- QIV x Compare the advantages and disadvantages of the census and sample method. 3

- y Two cards are drawn from a pack of cards without replacement. Find the probability that the cards are 6

1. Both kings.
2. An ace and a Queen in that order.
3. At least one king.

- z The aggregate marks scored by students are normally distributed with mean 400 and standard deviation 100. What percentages of students taking this test scored: 7

1. Between 300 and 550
2. More than 550
3. Less than 280

[Given $P(0 < z < 1) = 0.3413$, $P(0 < z < 1.2) = 0.3849$, and $P(0 < z < 1.5) = 0.4332$; where z is standard normal variate]

- Q.5 a Explain what you understand by process control. How is it achieved? 3

- b Obtain control limits for the mean chart for 10 samples of size 5 for the data given below. Draw a control chart for \bar{X} . Can the process is said to be under control with respect to mean? 6

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	43	49	37	44	45	37	51	46	43	47
Range	5	6	5	7	7	4	8	6	4	6

(For sample size 5, $A_2=0.577$).

- c A can hit a target 3 times in 5 shots, B 2 times in 5 shots and C 3 times in 4 shots. If A, B, C fire simultaneously, find the probability that two shots hit the target. 7

OR

- Q.V x What is control chart? Explain the basic principle underlying the control charts 3

- y A machine is set to deliver packets of a given weight. 10 samples of size 5 each were recorded. Below are given relevant data: 6

Sample No.	1	2	3	4	5	6	7	8	9	10
Range	7	7	4	9	8	7	12	4	11	5

Draw the R- chart and comment on the state of control.
($n=5$, $D_3=0$ and $D_4=2.115$)

- z In a certain college, the students engage in various sports in the following proportions: Football(F): 60% of all students; Basketball(B):50% of all students; Both football and basketball: 30% of all students. 7
- If a student is selected at random, what is the probability that he will:
1. Play football or basketball?
 2. Play neither sports?
 3. Play only football?
 4. Play only basketball?
 5. Play only one of the sport?