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) Programmable Calculators not allowed
5) Log tables and graph papers will be supplied on request.

Q.1 Attempt the following:

a) For a bivariate data $bxy = \frac{9}{4}$, $byx = \frac{4}{25}$, $\sigma_x = 15$ Find γ and σ_y. **(3)**

b) The incidence of certain disease is such that on an average 20% of workers suffer from it. If 10 workers are selected at random find the probability that:
   i)   Exactly 2 suffer from the disease.
   ii) Not more than 2 suffer from diseases. **(6)**

c) A committee of five members is to be formed from a group of 8 boys and 7 girls. Find the probability that the committee will consists of i) 3 boys and 2 girls ii) Atleast one girl. **(7)**

OR

Q.I Attempt the following:

x) What is regression? What are its uses? **(3)**

y) The average no. of misprints per page of a book is 1.5. What is the probability that a particular page is free from misprints? If the book contains 800 pages. How many of these contains more than one misprints.($e^{-1.5} = 0.4332$) **(6)**

z) If two dice are thrown, what is the probability that the sum is i) either 7 or 11and ii) neither 7 nor 11. **(7)**

Q.2 Attempt the following:

a) State and prove the multiplication theorem. **(3)**

b) Calculate coefficient of correlation for the following: **(6)**

X:	44	49	52	52	47	76	65	60	63	58
Y:	48	58	45	60	43	80	58	50	77	46

c) Five samples are drawn from the output of a small scale Industry. The no. of faults in each sample s listed as follows: **(7)**

Sample:	S_1	S_2	S_3	S_4	S_5
Defects:	3	1	2	0	1

Draw the control chart for C and check whether the system is in control.

OR

Q.II Attempt the following:

x) Define 1) Trial and event 2) Sample space. **(3)**

x) Find the coefficient of correlation given the following data: **(6)**

$$\sum X = 0, \sum Y = 26, \sum X^2 = 10, \sum Y^2 = 188.56, \sum XY = 21.4, n = 5$$

y) The following table gives the no. of defectives in 12 samples of size 50. Prepare a control chart for the proportion defectives. **(7)**

Sample No.	1	2	3	4	5	6	7	8	9	1	11	12
No. of defectives:	3	2	0	2	3	3	4	4	4	3	2	0

Q.3 Attempt the following:

a) Write a short note on multi-Stage sampling. **(3)**

b) Find the mean value of the variables x and y and the coefficient of correlationfrom the following

c) An ambulance service claims that it takes on an average 8.9 *mins* for an ambulance to reach its destination in emergency calls. To check on this claim the agency which licenses ambulance service has timed them on 50 emergency calls, getting a mean of 9.3 *mins*. With a $S.D. = 1.6$ *mins*. What can they conclude at the level of significance 5%. Also find the 95% confidence limits. (7)

<center>OR</center>

Q.III Attempt the following:

x) Compare the advantages and disadvantages of the census method and sample method (3)

y) Calculate the value of the Spearman's rank correlation coefficient. (6)

Marks in Economics:	25	28	32	36	40	38	39	42	41	45
Marks in Mathematics:	70	80	85	75	65	39	48	50	54	66

z) i) Out of 36 students appearing for SSC examination from a school, only 19 passed. Does this mean that the passing percentage from this school in general is 60% at 1% level of significance? (4)

ii) In a sample of 400 parts manufactured by a company, the no. of defectives parts was found to be 30. Find the 99% confidence limit for the % of defectiveparts. (3)

Q.4 Attempt the following:

a) State the physical condition under which Poisson distribution is used. (3)

b) The coefficient of correlation between 2 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 the coefficientof x and y and two regression equation. (6)

c) Seven samples of size 5 were drawn and the range for each sample is noted down, find the control limits and plot the R-chart and comment.
($D_3 = 0, D_4 = 2.115$ *For sample size of 5*). (7)

Samples:	S_1	S_2	S_3	S_4	S_5	S_6	S_7
Range R:	0.3	0.31	0.33	0.37	0.38	0.35	0.34

<center>OR</center>

Q.IV Attempt the following:

x) Define Binomial distribution and state its properties. (3)

y) The coefficient of rank correlation of the marks obtained by 10 students in English and Economics was found 0.5. It was later discovered that the difference in ranks in two subjects obtained by one of the students was wrongly taken as 3 instead of 7. Find the correct coefficient of rank correlation. (6)

z) The following are the sample mean and range of 10 samples each of size 5. Calculate the control limits for the Mean chart and state whether the process is in control or not. (7)
(Given $A_2 = 0.577$ for the sample of size 5)

Sample:	1	2	3	4	5	6	7	8	9	10
Mean:	5.10	4.98	5.02	4.96	5.04	4.94	4.92	4.92	4.92	4.98
Range:	0.3	0.4	0.2	0.4	0.1	0.1	0.8	0.5	0.3	0.5

Q.5 Attempt the following:

   a) Explain the terms 1) Hypothesis and 2) critical region   (3)

   b) A marksman's chance of hitting target is $4/5$. If he fires 5 shots, what is the probability of his hitting the target i) exactly twice ii) Atleast once?   (6)

   c) i) From a bag containing 3 red balls and 2 white balls a man is to draw two balls at random without replacement. He gains Rs. 20 for each red ball and Rs. 30 for each white ball. What is the expectation of his draw?   (4)

      ii) The following data are given for marks in subjects A and B in a certain examination   (3)

	A	B
Mean Marks	36	85
S.D.	11	8

Coefficient of correlation between A and B = 0.66

1) Determine the two equation of regression.

OR

Q.V Attempt the following:

x) Explain the terms 1) Null hypothesis and 2) Alternate hypothesis. **(3)**

y) The heights of 10,000 people are distributed normally with mean 172 and $S.D. = 5\ cms$ How many people will have height greater than $180\ cms$ and how many will have height less than $164\ cms$.(Area under the standard normal curve for $t = 0, t = 1.6\ is\ 0.445$) **(6)**

z) i) The probability that a student passes in statistics is $\frac{2}{3}$ and the probability that he passes in English is $\frac{4}{9}$. If the probability of passing in atleast one of the subject is $\frac{4}{5}$, what is the probability that he will pass in both subjects? **(4).**

ii) Coefficient of correlation is 0.8, Standard deviation of x is 4 and standard deviation of y is 9. Compute both the regression coefficients. **(3)**