ASSIGNMENT-1 (DMSTT21)

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Statistical Quality Control

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) *What is Control Chart? Discuss the role of* Control Charts in manufacturing processes.

b) Explain the construction and operation of median and mid range Control Charts.

Q2) a) Explain the construction of $\bar{X}$-chart. Obtain its O.C. and ARL.

b) Explain the standard deviation Control Chart.

Q3) a) Explain the construction of *np* chart.

b) Write a note on natural tolerance limits and specification limits.

Q4) a) Explain the construction of C-Chart. Give its applications.

b) Explain the construction of Control Chart for fraction non-conforming.

Q5) a) Explain CUSUM Control Chart. How do you improve CUSUM for large shifts?

b) Discuss Chi-square and T^2 Control Charts.

ASSIGNMENT-2 (DMSTT21)

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Statistical Quality Control

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) Explain EWMA Control Chart.

b) Discuss the analysis of mean for variable data.

Q2) a) Define single sampling plan. Obtain its O.C. and ASN functions.

b) Describe MIL STD 105 E standard.

Q3) a) Explain double and sequential sampling plans. Obtain OC and ASN functions of double sampling plan.

b) Explain Dodge and Romig plans.

Q4) a) What are the advantages and disadvantages of acceptance sampling by variables. Explain a variable sampling plan when the standard deviation is known.

b) Discuss MIL STD - 414 and its use.

Q5) a) Explain the design of a variable sampling plan with a specified O.C. curve.

b) Explain continuous sampling plans.

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(DMSTT 22)

ASSIGNMENT-1

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Operations Research

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) Use simplex method to solve the following L.P.P:

Maximize $Z = 3x_1 + 2x_2 + 3x_3$

Subject to the constraints : $2x_1 + x_2 + x_3 \leq 2$

$$3x_1 + 4x_2 + 2x_3 \geq 8$$

and $x_1,\ x_2\ , x_3 \geq 0.$

b) Use duality to solve the following L.P.P:

Maximize $Z = 2x_1 + x_2$

Subject to the constraints: $x_1 + 2x_2 \leq 10$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1 - 2x_2 \leq 1$$

and $x_1, x_2 \geq 0.$

Q2) a) Use dual simplex method to solve the following L.P.P:

Minimize $Z = 6x_1 + x_2$

Subject to the constraints : $2x_1 + x_2 \geq 3$

$$x_1 - x_2 \geq 0$$

and $x_1,\ x_2 \geq 0.$

b) Use two-phase simplex method to solve the following L.P.P:

Minimize $Z = x_1 + 2x_2$

Subject to the constraints: $2x_1 + 5x_2 \geq 6$

$$x_1 + x_2 \geq 2$$

and $x_1, x_2 \geq 0$.

Q3) a) What are inventory models? Discuss EOQ model with different rates of demand.

b) A firm has a machine whose purchase price is Rs. 1,00,000. Its running cost and resale price at the end of different years are as follows:

Year	:	1	2	3	4	5	6
Running cost (Rs.)	:	7,500	8,500	10,000	12,500	17,500	27,500
Resale price (Rs.)	:	85,000	76,500	70,000	60,000	40,000	15,000

The firm has obtained a contract to supply the goods produced by the machine, for a period of 5 years from now. After this time period , the firm does not intend to use the machine. If the firm has a machine of this type, that is one year old, what replacement policy should it adopt if it intends to replace the machine not more than once?

Q4) a) Explain the policies for replacement of items that fail completely.

b) An item is produced at the rate of 50 items per day. The demand occurs at the rate of 25 items per day. If the set-up cost is Rs. 100 per set-up and the holding cost is Re. 0.01 unit of item per day, find the economic lot size for one unit, assuming that shortage is not permitted. Also find the time of cycle and minimum total cost for one run.

Q5) a) Explain

i) Maximin and minimax principle

ii) Dominance property and

iii) Graphical solution of 2×n game

b) Solve the following game by rules of dominance:

$$
\begin{array}{cc} & \text{B} \\ & \begin{array}{cccc} B_1 & B_2 & B_3 & B_4 \end{array} \\ \text{A} \begin{array}{c} A_1 \\ A_2 \\ A_3 \\ A_4 \end{array} & \begin{pmatrix} 2 & -2 & 4 & 1 \\ 6 & 1 & 12 & 3 \\ -3 & 2 & 0 & 6 \\ 2 & -3 & 7 & 1 \end{pmatrix} \end{array}
$$

(DMSTT 22)

ASSIGNMENT-2

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Operations Research

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) Use arithmetic method to solve the following game:

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} B \\ \begin{pmatrix} 10 & 5 & -2 \\ 13 & 12 & 13 \\ 16 & 14 & 10 \end{pmatrix} \end{array}$$

b) Solve the following game by using the simplex method:

$$\begin{array}{c} \\ A \end{array} \begin{array}{c} B \\ \begin{pmatrix} 90 & 80 & 110 \\ 110 & 100 & 90 \\ 120 & 70 & 80 \end{pmatrix} \end{array}$$

Q2) a) Explain M/M/1 queuing system. Obtain its steady – state solution. Find the waiting time distribution for the system.

b) Explain M/G/1 queuing system. Obtain Pollaczee – Kinchine formula.

Q3) a) Explain M/M/S queuing system. Obtain its steady state solution. Find the average number of customers in the system.

b) Explain $M/E_k/1$ system. Obtain its steady – state solution. Obtain the average waiting time of the phases in the system.

Q4) a) Explain the significance of using PERT/CPM. Describe the rules for activity-on-arrow network construction.

b) A socliologist plans a questionnaire survey consists of the following details:

Activity	Immediate Predecessor	Duration (days) Likely	Minimum	Maxi-mum
A	-	5	4	6
B	-	12	8	16
C	A	5	4	12
D	B	3	1	5
E	D, A	2	2	2
F	B	5	4	6
G	C, F, F	14	10	18
H	G	20	18	34

Draw the network diagram. Find the critical path. What is the probability that the length of the critical path does not exceed 60 days?

Q5) a) Describe the phases of project management. Explain different types of floats and their use.

b) Consider a project having the following details:

Activity	Immediate Predecessor	Activity time (weeks). Likely	Minimum	Maximum
A	-	3	1	5
B	-	4	2	6
C	A	5	3	7
D	A	6	5	7
E	C	7	5	9
F	D	8	6	10
G	B	9	7	11
H	E, F, G	3	2	4

Draw the network. Find the critical path. What project duration will have 99% confidence of completion.

(DMSTT 23)

ASSIGNMENT-1

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Econometrics

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) Explain the simple linear model. Obtain the least squares estimators of the parameters. State and prove their properties.

b) Explain point prediction and interval prediction in the least squares model.

Q2) a) Explain:

i) log-linear
ii) semi-log and
iii) reciprocal models and their estimation

b) Explain ANOVA for two variable regression.

Q3) a) Explain the general linear model. State and prove the properties of OLS estimators.

b) Develop a test statistic for testing the significance of the complete regression.

Q4) a) Obtain the OLS estimators. State and prove Gauss-Markov theorem.

b) Discuss the problem of prediction when the explanatory variables are uncertain.

Q5) a) Obtain the restricted least squares estimators.

b) Discuss the tests of structural change in the restricted linear model.

(DMSTT 23)

ASSIGNMENT-2

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Econometrics

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) Explain MWD test.

b) What are dummy variables? Explain their use in seasonal adjustment.

Q2) a) Explain the generalised linear model. Obtain Aitken estimators.

b) What is the problem of heteroscedasticity? Explain its consequences and remedies.

Q3) a) What is multicollinearity? What are its sources and consequences? Discuss the remedies for multicollinearity.

b) Explain any two tests for the detection of heteroscedasticity.

Q4) a) What is meant by auto-correlation? What are its consequences for OLS? Discuss cochrone-orcutt procedure.

b) Explain PROBIT model. Explain a method of estimating the same.

Q5) a) What is serial correlation? Give its nature and consequences. Explain Durbin-Watson test.

b) Explain LOGIT model. Discuss a method of estimating the same.

(DMSTT 24)

ASSIGNMENT-1

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Multivariate Analysis

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) Define a p-variate normal distribution. Obtain its marginal and conditional distributions.

b) Obtain the distributions of sample mean and sample covariance matrix in a p-variate normal.

Q2) a) Obtain the m.l estimators of the mean vector and the covariance matrix in a p-variate normal.

b) State and prove a necessary and sufficient condition for one set of the random variables and the subset consisting of the remaining variables in a p-variate normal to be independent.

Q3) a) Derive the null distribution of T^2.

b) Develop a test statistic for testing the hypothesis that the mean vector is a given vector. Obtain the confidence region for the mean vector.

Q4) a) Explain MANOVA for one-way classification.

b) Explain likelihood ratio test for testing the hypothesis that the mean vectors and covariance matrices are the same.

Q5) a) Define principal components. Derive the expressions for the first and second principal components.

b) Explain principal factor method of estimation for estimating factor loadings.

(DMSTT 24)

ASSIGNMENT-2

M.Sc. DEGREE EXAMINATION, MAY – 2018

Second Year

STATISTICS

Multivariate Analysis

MAXIMUM MARKS:30

Answer ALL Questions

Q1) a) State and prove the properties of principal components.

b) Explain oblique rotation and orthogonal rotation of factors.

Q2) a) Detail tests associated with discriminant functions.

b) Explain the problem of classification with several multivariate populations.

Q3) a) Discuss the problem of classification of observations.

b) Explain the problem of classification into one of the two known multivariate normal populations.

Q4) a) Explain the concept of cluster analysis and its uses.

b) Explain :

i) K-means method and

ii) average linkage method

Q5) a) Discuss the similarity measures.

b) Explain any two linkage methods.

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