PGIVS 1516 A-18

M.A./M.Sc. IV[th] - Semester Examination

STATISTICS

(Operations Research) (CBCS)

Paper : SCT - 4.1(a)

Time : 3 Hours

Maximum Marks : 80

Instructions to Candidates:

Answer any **six** questions from **part A** and **five** from **part-B**

Part - A

(6×5=30)

1. Define the following terms in relation to lpp.

a) Basic feasible solution

b) Unbounded solution

c) Degenerate solution.

2. Explain primal and dual form of lpp and write the dual of the following lpp.

$$Max\ z = 45x_1 + 20x_2$$

$$S.to \quad 15x_1 + 4x_2 = 64$$

$$-5x_1 + 12x_2 \geq 20$$

$$x_1, x_2 \geq 0$$

3. Discuss Lagrangean method of solving non-linear programming problem.

4. State transportation problem. Explain MODI method for solving transportation problem.

5. Solve the following assignment problem.

	1	2	3	4
1	1	4	6	3
2	9	7	10	9
3	4	5	11	7
4	8	7	8	5

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6. Define integer programming problem. Distinguish between pure and mixed integer programming problem.

7. Discuss maximal flow method of solving network problem

8. Define

i) Purchase price

ii) Scheduling period and

iii) Lead time of inventory problem.

Part - B (5×10=50)

9. For a given lpp Max $Z = CX$. subject to the constraint $AX = b,\ X > 0$. show that at some iteration of simplex technique we have $c_j - z_j \le 0$ for all $a_j \in A$, then the optimal stage has been reached. **(10)**

10. Solve the following lpp using two phase method.

$$\begin{aligned}
&Min\ z = -x_1 + 2x_2 - 3x_3 \\
&S.to \quad x_1 + x_2 + x_3 = 6 \\
&\quad -x_1 + x_2 + 2x_3 = 4 \\
&\quad 2x_2 + 3x_3 = 10 \\
&\quad x_3 \le 2 \\
&\quad x_1, x_2, x_3 \ge 0
\end{aligned}$$

(10)

11. Show the following:

a) The dual of the dual is primal.

b) If X_0 is feasible solution of the primal and w_0 is the feasible solution of the dual and if $CX_0 = d'w_0$ then X_0 is optimal for primal and w_0 is optimal for dual. **(4+6)**

12. State and prove a set of sufficient condition for a stationary point to be an extreme point. **(10)**

13. Solve the following transportation problem using stepping stone algorithm and obtain b.f.s by MODI method. **(10)**

	1	2	3	4	a_i
1	10	0	20	11	15
2	12	7	09	20	25
3	0	14	16	18	5
b_j	5	15	15	10	

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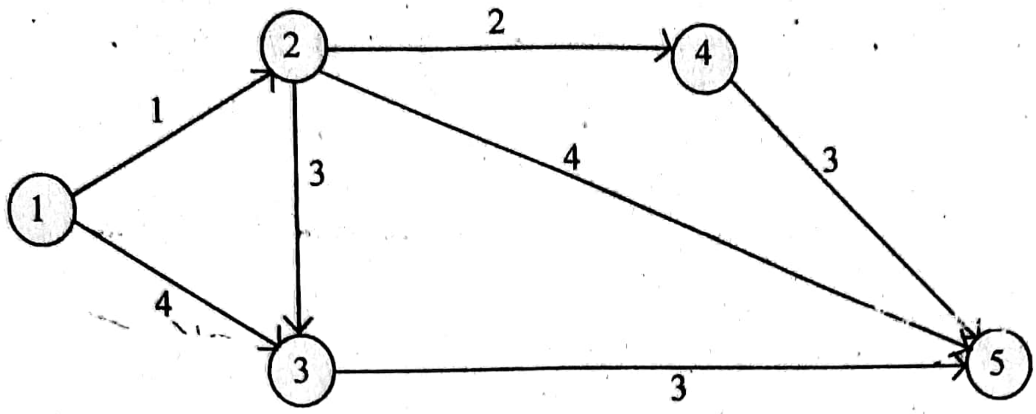
14. Find the shortest route from node 1 to each of the other nodes of the following network problem (10)



15. Discuss Harry's model of an inventory problem. (10)

16. Write short notes on any **Two** of the following. (2×5=10)

a) Quadratic programming problem

b) Hungarian method of Solving an assignment problem.

c) Vogel's method of solving transportation problem.

d) Inventory problem with space restriction.

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PGIVS 1517 A-18
M.A./M.Sc. IVth Semester Examination
STATISTICS
(Multivariate Analysis) (CBCS)
Paper : HCT - 4.2

Time : 3 Hours **Maximum Marks : 80**

Instructions to Candidates:

Answer any **six** questions from part A and **five** from part-B

PART - A (6×5=30)

1. Let $X \sim N_p(\mu, \Sigma), \Sigma$ is positive definite matrix. Obtain the distribution of $(X-\mu)' \Sigma^{-1}(X-\mu)$

2. Obtain the characteristic function of a p-variate normal random, vector.

3. Obtain the distribution of sample mean vector when the sample is taken from Multivariate normal distribution.

4. Define Hotelling's T^2 and Mahalanobis D^2 Statistic. Establish the relationship between them.

5. State and prove the additive property of wishart distribution.

6. Describe Fisher's linear discriminant function for two populations

7. If $X_\alpha \sim N_p(\beta Z_\alpha, \Sigma)$ where $Z_\alpha' S$ are known vectors $\alpha = 1,2,....,n$, find the MLE of β.

8. What are canonical correlations? Give a real life example of application of them.

PART - B (5×10=50)

9. Obtain the conditional distribution of $X^{(1)}$ given $\alpha^{(2)} = x^{(2)}$, when $X = \left(X^{(1)'} \; X^{(2)'}\right)'$ has $N_p(\mu, \Sigma)$ distribution.

10. Given a random sample of size n from $N_p(\mu, \sigma^2 I)$ distribution, Obtain the MLE's of μ *and* σ^2

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11. Outline the likelihood ratio test of the hypothesis of equality of covariance matrices of two multivariate normal populations.

12. Derive the Hotelling's T^2 distribution in the one sample null case.

13. Derive the likelihood ratio statistic for testing $H_0 : \sum = \sum_0$ where $\sum_0$ is a given matrix, on the basis of a random sample from $N_p(\mu, \sum)$ distribution.

14. State the one-way MANOVA model with assumptions. Derive a test procedure to test the equality of treatment means.

15. Describe the problem of classification. Assuming that the misclassification costs are equal derive an appropriate classification rule for the two multivariate normal populations.

16. Discuss the procedure for obtaining the first principal component, from the covariance matrix $\sum$.

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