

Q. P. Code : 32427

Total marks: 75

Time allowed: 2 ½ hrs

NOTE: 1. Use of simple calculator is allowed

2. All questions are compulsory subject to internal choice

3. For questions 2 to 5 , attempt either A and B or C and D

4. Figures to the right indicate full marks

Q1 A Fill in the blanks choosing the correct alternatives (any seven) 7

- 1 If we reject  $H_0$  when  $H_0$  is actually false, then we are committing \_\_\_\_\_ error.  
(a) Type I (b) Type II  
(c) right (d) both
- 2 The linear function  $z$  which is to be minimized or maximized in a LPP is called \_\_\_\_\_  
(a) Decision variable (b) objective function  
(c) optimum function (d) logical function
- 3 If the determinant of a square matrix is zero then the matrix is called \_\_\_\_\_ matrix  
(a) singular (b) non-singular  
(c) unit (d) zero
- 4 The inverse ratio of 4:5 is  
(a) 3:4 (b) 8:10  
(c) 5 : 4 (d) none of these
- 5 If  $0.75:x :: 5:8$  then  $x$  is equal to  
(a) 1.12 (b) 1.2  
(c) 1.25 (d) 1.30
- 6 15% of 475 is \_\_\_\_\_  
(a) 49 (b) 56  
(c) 79.2 (d) 71.25
- 7 Infrastructure facilities consist of  
(a) Railways (b) inflation  
(c) income (d) real income
- 8 A matrix is said to be zero matrix if all the elements of the matrix are  
(a) ones (b) zeros  
(c) two (d) three
- 9 In simplex method the intersecting element of key row and key column is known as \_\_\_\_\_ element  
(a) Key (b) non-key  
(c) initial (d) none of these
- 10 The difference between all receipts(revenue and capital) and all expenditures (revenue and capital) is called the \_\_\_\_\_  
(a) Budgetary deficit (b) budgetary profit  
(c) fiscal deficit (d) fiscal profit

- B State whether the following statements are True or False (any eight) 8**
- 1 The hypothesis rejecting the null hypothesis is called wrong hypothesis.
  - 2 Linear programming forms the basic foundation for an important branch of Mathematics and Statistics called Operational Research.
  - 3 A matrix of order  $1 \times n$  is called a column matrix
  - 4 Fourth proportion to 6, 10, 21 is 35
  - 5 Percentage of fraction  $3/4$  is 25%
  - 6 Constraints are the restrictions on the use of limited resources
  - 7 Railways, roadways, hospitals are not included in infrastructure
  - 8 GDP growth rate is one of the most important economic indicators of a country's economy
  - 9 NNP is GDP minus depreciation
  - 10 Test of statistic is used to decide whether to accept or reject  $H_0$
- Q2 a Solve the LPP graphically 7**  
 Minimize  $z = 8000x + 12000y$   
 subject to  $x + 3y \geq 30$   
 $3x + 4y \geq 60$   
 $x, y \geq 0$
- b Suppose an editor of a publishing company claims that the mean time to write a text book is 15 months. A sample of 16 textbook authors is randomly selected and it is found that the mean time taken by them was 12.5. Assume the standard deviation as 3.6 and using 5% level of significance would you conclude the editor's claim is true? 8**
- OR**
- c Solve the following using simplex method 10**  
 Maximize  $z = 9x_1 + 13x_2$   
 Subject to  $2x_1 + 3x_2 \leq 18$   
 $2x_1 + x_2 \leq 10$   
 $x_1, x_2 \geq 0$
- d A manufacturer produces two types of steel trunks. He has two machines A and B. the first type of trunk requires 5 hours on machine A and 3 hours in machine B. The second type requires 3 hours on machine A and 2 hours on machine B. Machine A and B can work at most for 24 hours and 15 hours per day respectively. He earns a profit of Rs.30 and Rs.25 per trunk on the first type and second type respectively. Formulate the LPP to make the maximum profit. 5**
- Q3 a A, B and C invested Rs.10000, Rs.20000 and Rs.30000 respectively in a business. At the end of the year B received Rs.3000 as his share in the profit. Find the total profit. Also find A's and C's share of profit. 7**
- b Find the inverse of the matrix 8**  
 $A = \begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$

OR

- c Food I contains 3 units of vitamin A and 1 unit of vitamin B. Food II contains 2 units of vitamin a and 3 units of vitamin B. If the daily requirement of vitamin A and B are 12 and 11 respectively. Translate the problem into a system of equations. Solve the system of equations by matrix method and hence find the amount of Food I and II that will satisfy the daily requirements **10**
- d A 9% loss was incurred by selling an article at Rs.11648. Find the selling price if the article was sold at 6% loss. **5**

- Q4 a An investment expert has studied past data and constructed the following table of five possible states of economy with corresponding probabilities and the return of two shares A and B under these states of economy. Find and compare the expected return of both the shares **7**

Economic conditions	Probability	Returns of Share A (%)	Returns of Share B (%)
E1	0.1	-3	2
E2	0.3	-1	4
E3	0.2	6	7
E4	0.3	9	8
E5	0.1	12	10

- b From the following information calculate Beta of a security **8**

Year	Return on Security (%)	Return on Market portfolio (%)
1	-3	-1
2	5	6
3	10	3
4	6	7

OR

- c Two shares X and Y are in portfolio in the proportions 80% and 20% respectively **10**

Economic conditions	Probability	Returns of Share X(%)	Returns of Share Y(%)
Depression	0.1	-3	-1
Recovery	0.2	5	0
Prosperity	0.3	14	8
Recession	0.4	10	4

Find

- (1) Expected return from share X
- (2) Expected return from share Y
- (3) Total risk of share X
- (4) Total risk of share Y
- (5) Covariance of return from share X and Y
- (6) Expected return of the portfolio P
- (7) Total risk of portfolio P

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- d Give the formula for the total risk in terms of systematic and unsystematic risk. Find systematic risk if unsystematic risk is 11.85 and the total risk is 56.25 **5**
- Q5** a Define GDP, GNP, NDP, NNP **7**  
Explain briefly electricity generation in infrastructure
- b In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? Use 5% level of significance. **8**
- OR**
- Attempt any three questions **15**
- c Explain in short the different measures of money supply, giving their formulae
- d Explain duality in linear programming with an example
- e Explain any 3 different types of matrices with example
- f What are Type I and Type II errors? Explain briefly
- g Explain trade balance, capital account balance

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