

Total No. of Questions : 6]

SEAT No. :

PA-1813

[Total No. of Pages : 6

[5952]-411

S.Y. B.Com.

**246 F : Business Statistics - II**  
**(2019 Pattern) (Semester - IV)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates :*

- 1) *Question No. 1 and Question No. 6 are compulsory.*
- 2) *Solve any three questions from the remaining question from 2, 3, 4 and 5.*
- 3) *Figures to the right indicate full marks.*
- 4) *Use of calculator and statistical table is allowed.*

**Q1) Choose the correct alternative from each of the following (Any Ten) :**

**[1 Mark Each]**

- a) If in a LPP, the solution of a variable can be made infinity large without violating the constrain the solution is \_\_\_\_\_.
  - i) Infeasible
  - ii) Unbounded
  - iii) Alternative
  - iv) None of the above
- b) A rise in prices before Diwali is an example of \_\_\_\_\_.
  - i) Cyclical variation
  - ii) Irregular variation
  - iii) Secular Trend
  - iv) Seasonal variation
- c) Every LPP is associated with another LPP is called \_\_\_\_\_.
  - i) Primal
  - ii) Dual
  - iii) Non-linear programming
  - iv) None of the above

***P.T.O.***

- d) In marking assignments, which of the following should be preferred?
- Only row having single zero
  - Only column having single zero
  - Only row/column having single zero
  - Column having more than one zero
- e) \_\_\_\_\_ are expressed is in the form of inequities or equations.
- Constraints
  - Objective Functions
  - both i) and ii)
  - None of the above
- f) \_\_\_\_\_ is a method for computing a basic feasible solution of a transportation problem, where the basic variables are chosen according to the unit cost of transportation.
- Least cost method
  - Vogel's approximation method
  - North west corner method
  - Modified distribution method
- g) Additive model for time series  $Y =$  \_\_\_\_\_.
- $T \times S \times C \times I$
  - $T - S - C - I$
  - $T + S + C + I$
  - $T + S - C \times I$
- h) To make an unbalanced assignment problem balanced, what are added with all entries as zeroes?
- Dummy rows
  - Dummy columns
  - both i) and ii)
  - Dummy entries
- i) For solving an assignment problem, which method is used?
- Least cost method
  - Hungarian method
  - Vogel's approximation method
  - None of the above

- j) Which of the following methods is used to verify the optimality of the current solution of the transportation problem \_\_\_\_\_
- Least cost method
  - Vogel's approximation method
  - Modified distribution method
  - All of the above
- k) The constant in exponential smoothing method in time series is known as \_\_\_\_\_.
- Smoothing constant
  - Smoothing variable
  - Exponential constant
  - Exponential variable
- l) In transportation problem, if opportunity cost  $d_{ij} = c_{ij} - (u_i + v_j) = 0$  for some  $i$  and  $j$  in the optimal solution then there exists \_\_\_\_\_.
- Bounded solution
  - Alternate solution
  - Infeasible solution
  - Alternate solution does not exist

**Q2) Attempt the following :**

- a) Distinguish between seasonal variations and cyclic variations. **[3]**
- b) Compute 3 yearly moving averages for the following data : **[4]**

Year	1988	1989	1990	1991	1992	1993	1994	1995
Production (in tones)	78	73	71	73	75	78	73	77

- c) Fit a second degree trend by the method of least squares to the following data : [8]

Year	1993	1994	1995	1996	1997
Sales in 10,000	35	56	79	80	40

Also estimate sales for year 1998.

**Q3) Attempt the following :**

- a) Define the term 'Initial Basic Feasible Solution (IBFS)' in the Linear Programming Problem. [3]

- b) Obtain the dual problem of the following Linear programming problem

$$\text{Minimize } Z = 17X_1 + 13X_2 + 18X_3$$

Subject to

$$18X_1 + 12X_2 + X_3 \geq 13$$

$$13X_1 + 16X_2 + 14X_3 \geq 14$$

$$14X_1 + X_2 + 15X_3 \geq 11$$

$$X_1 + 15X_2 + 12X_3 \geq 17$$

$$X_1, X_2, X_3 \geq 0$$

[4]

- c) Using Simplex Method, Solve the following linear programming problem

$$\text{Max } Z = 2X_1 + 3X_2 + 4X_3$$

Subject to

$$3X_1 - 2X_3 \leq 41$$

$$2X_1 + X_2 + X_3 \leq 35$$

$$2X_2 + 3X_3 \leq 30$$

$$X_1, X_2, X_3 \geq 0$$

[8]

**Q4) Attempt the following :**

- a) Explain the difference between the transportation problem and assignment problem. [3]
- b) Obtain initial basic feasible solution using North West Corner method for following transportation problem.

Markets →	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	Capacity
Sources ↓					
O <sub>1</sub>	3	5	7	6	50
O <sub>2</sub>	2	5	8	2	75
O <sub>3</sub>	3	6	9	2	25
Demand	20	20	50	60	150

Also find the corresponding transportation cost. [4]

- c) Obtain initial basic feasible solution using Vogel Approximation method for following transportation problem.

Warehouse →	W <sub>1</sub>	W <sub>2</sub>	W <sub>3</sub>	W <sub>4</sub>	Capacity
Factory ↓					
F <sub>1</sub>	19	30	50	10	7
F <sub>2</sub>	70	30	40	60	9
F <sub>3</sub>	40	8	70	20	18
Demand	5	8	7	14	34

Is this solution is optimal? [8]

**Q5) Attempt the following :**

- a) What is an unbalanced assignment problem? How to make such problem balanced? [3]

- b) Three different airplanes are to be assigned to handle three cargo consignments with a view to maximize profit (in lakh rupees). The profit matrix is given as follows : [4]

Airplanes	Cargo Consignment		
	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>
A <sub>1</sub>	1	4	5
A <sub>2</sub>	2	3	3
A <sub>3</sub>	3	1	2

- c) A company has four jobs to be done. The following matrix shows the time (in hours) taken on 4 different machines find minimum solution so as to minimize the total time required. [8]

	I	II	III	IV
A	5	23	14	8
B	10	25	1	23
C	35	16	15	12
D	16	23	21	7

**Q6) Attempt any Three of the following :** [15]

- Explain 'Transportation Problem'.
- Write an algorithm to solve assignment problem for optimal cost.
- Explain the different components of time series with illustration.
- What is degeneracy in L.P.P. solution? Explain how degeneracy is resolved?
- Describe the method of exponential smoothing used for the estimation method.

