Anekant Education Society's

Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

Autonomous

QUESTION BANK

FOR

S.Y.B.Com.(SEM-IV)

Paper-I

COMBS2401: Business Statistics-IV

UNIT 1: Time Series

A) Questions for 1 mark

I] Choose the correct alternative

1. Additive model for time series Y =. . .
A) T × S × C × I
B) T − S − C− I
C) T + S + C + I
D) None

2. The most commonly used mathematical method for measuring the trend is
A) Semi Average
B) Moving Average
C) Free Hand Curve
D) Least Squares

3. A rise in prices before Eid is an example of
A) Cyclical Trend
B) Secular Trend
C) Irregular Trend
D) Seasonal Trend

4. Prosperity, Recession, and depression in a business is an example of
A) Irregular Trend
B) Secular Trend
C) Cyclical Trend
D) Seasonal Trend

5. In moving average method we cannot find trend values of some
A) End Periods
B) Middle Period
C) Starting and End Periods
D) Starting Periods

6. Seasonal variations are
A) None
B) Short term variation
C) Long term variation
D) Sudden variation

7. A fire in a factory delaying production for some weeks is
A) Secular Trend
B) Cyclical Trend
C) Irregular Trend
D) Seasonal Trend

8. Multiplicative model for time series is Y =. . .

A) $T \times S \times C \times I$

B) $T + S + C + I$

C) None

D) $T - S - C - I$

9. In the theory of time series, shortage of certain consumer goods before the annual budget is due to

A) Seasonal Variation

B) Secular Trend

C) Irregular Variations

D) Cyclical Variation

10. A set of observations recorded at an equal interval of time is called

A) Array data

B) Data

C) Geometric Series

D) Time series data

11. The best fitted trend line is one for which sum of squares of residuals or errors is

A) Positive

B) Minimum

C) 1

D) Negative

E) Maximum

12. Graph of time series is called

A) Line graph

B) Trend

C) Historigram

D) Histogram

13. In the measurement of the secular trend, the moving averages:

A) Smooth out the time series

B) None

C) Give the trend in a straight line

D) Measure the seasonal variations

14. The following are the movement(s) in the secular trend

A) Smooth

B) Regular

C) None

D) Steady

15. Time series data have a total number of components?
A) 3
B) 5
C) 6
D) 4

16. The following series is not time series

A) Price of gold B) Price of share
C) Population D) Area of country

17. The fluctuations in a time series which repeat regularly every year or some specific period of time is observed in

A) Secular trend B) Seasonal variations
C) Cyclical variations D) Irregular variations

II] State whether the following statements are True or False:

1. In additive model of time series, it assumes that there is no interaction between all the components and act independently.
2. Irregular variations are predictable in the analysis of time series.
3. Seasonal variation occurs the regularly during the year.
4. Cyclical variation is known as business cycle.
5. Moving average method is same as simple average method.

III] Answer the following (1 mark each)

State the following:

1. Components of time series.
2. Additive model.
3. Multiplicative model.
4. Linear model
5. Exponential model

B) Question of 2marks

1. Given $\alpha = 0.1$, estimate the profit for the year 2018 using exponential smoothing method for:

Year	Profit(in crores)
2016	21.8
2017	24.5

2. Define time series. Give any two time series in business.

3. Define time series. State the four components of time series.

4. State any two differences in secular trend and Seasonal variation.

5. State any two time series each belonging to seasonal and irregular variation.

C) Questions for 4 marks

1. Find 5- yearly moving average of the production of commodity for the year 2001 to 2013 as given below:

Year	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Production('000)	3	5	7	8	10	12	19	21	24	35

2. Find 3- yearly moving average of the production of commodity for the year 2009 to 2018 as given below:

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Production('000)	11	14	13	12	14	16	19	21	24	27

3. Describe the method of fitting second degree curve.

4. Describe the component 'Cyclical variation'.

5. Describe the component 'Irregular variation'.

D) Questions for 6 marks

1. Find 4-yearly moving average of the production of commodity for the year 2008 to 2017 as given below:

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Sales	20	21	22	24	23	25	27	29	28	27

2. Fit a trend line to the following data by least square method.

Year	2010	2011	2012	2013	2014
Sales	12	20	28	32	50

Also obtain the trend value of sales for the year 2017.

3. .Find 5- yearly moving average of the production of commodity for the year 2009 to 2018 as given below:

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Production('000)	11	14	13	12	14	16	19	21	24	27

Also plot the trend values with original observation on same graph.

4. Estimate the trend using $\alpha = 0.10$ smoothing constant for the following time series. Also plot the trend values with original observation on same graph.

Year	1	2	3	4	5	6	7	8	9	10
Sales	31	37	39	41	41	39	33	29	27	29

5. Construct one case study from business where time series may be applied.

UNIT 2: Simplex Method

A) Questions for 1 mark

I] Choose the correct alternative

1. Simplex method can be used to solve

A) Only two variables B) Two or more than two variables
C) Only more than two variables D) None of them

2. Simplex is

A) Graphical method B) Statistical method
C) Mathematical method D) None of them

3. Simplex is used solve LPP for

A) Maximization only B) Minimization only
C) Both Maximization and Minimization D) None of them

4. LPP may be solve by:

A) Graphical Method B) Simplex Method
C) Transportation Problem. D) All the Above

5. If constraint in LPP is greater than or equal to type then to convert it into an equation we subtract a variable such a variable is called

A) Slack variable
B) Surplus variable

C) Artificial variable
D) Non-Basic variable

6. Maximize $Z = 6X_1 + 4X_2$

Subject to constraints,

$$2X_1 + 3X_2 \leq 30$$

$$3X_1 + 2X_2 \leq 24$$

$$X_1, X_2 \geq 0$$

To convert above problem in the standard form of LPP, how many slack variables required?

A) 0
B) 1
C) 2
D) 3

7.If primal objective function is minimization type then dual objective function is

A) Minimization
B) Maximization
C) Non linear
D) None of the above

8. If constraint in LPP is of $\geq$ type then to convert it into an equation we subtract a variable such a variable is called

A) Slack variable
B) Surplus variable
C) Artificial variable
D) Non-Basic variable

9.In LPP the condition to be satisfied is

A) Constraints have to be linear
B) Objective function has to be linear
C) none of the above
D) both a and b

10.Constraints in an LP model represents

A) Limitation
B) Requirements
C) Balancing limitations and requirements
D) All of the above

II] State whether the following statements are True or False:

1. Graphical method is used to solve LPP for more than two variables.
2. Simplex method is a mathematical method to solve LPP.
3. Simplex method cannot be used to minimization problem.
4. The solution to the dual problem provides a lower bound to the solution of the primal (minimization) problem.

III] Answer the following (1 mark each)
Define the following

1. Basic variable
2. Surplus variable
3. Slack variables
4. Optimum solution
5. LPP

B) Question of 2marks

1. When you will get the optimal solution in simplex method?
2. Write mathematical form of L.P.P. in simplex method?
3. Explain the term standard form of L.P.P.
4. What do you mean by pivot element in simplex table?
5. When you will get alternate solution in simplex algorithm?

C) Questions for 4 marks

1. Obtain the dual problem of the following linear programming problem :

$$\text{Minimize } z = 4700x_1 + 7200x_2$$

Subject to :

$$31x_1 + 4x_2 \geq 345$$
$$18x_1 + 9x_2 \geq 101$$
$$x_1, x_2 \geq 0$$

2. Obtain the dual problem of the following linear programming problem :

$$\text{Minimize } z = 130x_1 + 120x_2$$

Subject to :

$$17x_1 + 10x_2 \geq 10$$
$$11x_1 + 14x_2 \geq 20$$
$$x_1, x_2 \geq 0$$

3. Obtain the initial simplex table for

$$\text{Maximize } Z = 4X + 10Y$$

Subjected to,

$$2X + Y \leq 50$$
$$2X + 5Y \leq 100$$
$$X, Y \geq 0.$$

Also comment on which is entering and leaving variable.

4. Distinguish between the dual and primal problem.

D) Questions for 6 marks

1. Solve the following LPP by simplex method

$$\text{Maximize } z = 2000x_1 + 3000x_2$$

Subject to :

$$600x_1 + 900x_2 \leq 9000$$
$$300x_1 + 150x_2 \leq 3000$$
$$x_1, x_2 \geq 0$$

2. Solve the following LPP by simplex method up to 2 iteration including initial table.

$$\text{Maximize } Z = 7X + 5Y$$

Subjected to,

$$X + 2Y \leq 6$$
$$4X + 3Y \leq 12$$
$$X, Y \geq 0$$

Also comment on which is entering and leaving variable at each iteration.

3. Construct one case study from business where simplex method can beapply.

UNIT 3: Transportation Problem (T.P.)

A) Questions for 1 mark

I] Choose the correct alternative

1. Which of the following is used to come up with a initial basic feasible solution to the transportation problem?

A. northwest corner method

B. Least cost method

C. VAM method

D. All above

2. The northwest corner rule requires that we start allocating units to shipping routes in the:

A. Lower right corner of the table.

B. Upper right corner of the table.

C. highest costly cell of the table.

D. Upper left-hand corner of the table.

3. In a transportation problem, when the number of occupied cells is equal to the number of rows plus the number of columns -1, we say that the solution is:

A. Unbalanced.

B. Feasible.

C. Optimal.

D. Infeasible.

4. In a transportation problem, the sum of demands is equal to supply then, we say that the problem is:

A. Unbalanced.

B. Balance.

C. Dummy.

D. Non of above

.

5. In a transportation problem, the name of method of optimality is:

A. MODI.

B. VAM.

C. U-V Method.

D. Non of above

.

6. We can solve transportation problem introducing dummy Sources or Destinations when problem is:

A. Unbalance.

B. Balance.

C. Both A and B.

D. Non of above

7. Which transportation method gives the minimum transportation cost from i.b.f.s.:

A. MODI.

B. VAM.

C. Matrix Minima Method.

D. North Corner Rule

.

8. LPP may be solve by:

A. Graphical Method.

B. Simplex Method

C. Transportation Problem.

D. All above

.

9. To test optimality of solution of Transportation problem (TP) with 4 origins and 5 destinations, the number of basic cells should be

A. 8

B. 19

C. 9

D. 2

II] State whether the following statements are True or False:

1. Assignment problem is particular case of the transportation problem.
2. We never solve an unbalance transportation problem.
3. Transportation problem is can be formulate in terms of LPP.
4. VAM gives the minimum transportation cost from i.b.f.s.
5. MODI method is used to test of optimality of transportation problem.

III] Answer the following (1 mark each)

A) Define the following:

1. Optimum solution
2. Initial basic feasible solution
3. Balance T. P.
4. Unbalance T. P.
5. Destination

B) Question of 2marks

1. State any two real life situations from business where transportation problem may be used.

2. Explain the concept of balance transportation problem.

3. What is role of dummy source or destination in transportation problem?

4. Write a mathematical form of transportation problem.

5. Explain the transportation problem in tabular form.

C) Questions for 4 marks

1. Obtain initial basic feasible solution using North West Corner method for following transportation problem.

Markets→ Sources↓	D_1	D_2	D_3	Supply
O_1	13	15	16	17
O_2	7	11	2	12
O_3	19	20	9	16
Demand	14	8	23	

Also find the corresponding transportation cost.

2. Obtain initial basic feasible solution using North West Corner method for following transportation problem.

Markets→ Sources↓	D_1	D_2	D_3	D_4	Supply
O_1	3	5	7	6	50
O_2	2	5	8	2	75
O_3	3	6	9	2	25
Demand	20	20	50	60	

Also find the corresponding transportation cost.

3. Obtain initial basic feasible solution using Matrix Minima method for following transportation problem.

Markets→ Sources↓	D_1	D_2	D_3	Supply
O_1	16	20	12	200
O_2	14	8	18	160
O_3	26	24	16	90
Demand	180	120	150	

Also find the corresponding transportation cost.

4. Obtain initial basic feasible solution using Matrix Minima method for following transportation problem.

Warehouse→ Factory↓	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Demand	20	40	30	10	

D) Questions for 6 marks

1. Obtain initial basic feasible solution using VAM for the following transportation problem.

Warehouse→ Factory↓	D_1	D_2	D_3	D_4	Supply
O_1	5	3	6	4	30
O_2	3	4	7	8	15
O_3	9	6	5	8	15
Demand	10	25	18	7	

Is this solution is optimal?

2. Obtain initial basic feasible solution using VAM for the following transportation problem.

Warehouse→ Factory↓	D_1	D_2	D_3	D_4	Supply
O_1	1	2	1	4	30
O_2	3	3	2	1	50
O_3	4	2	5	9	20
Demand	20	40	30	10	

Is this solution optimal?

3. Following is the basic feasible solution of certain transportation problem.

Markets→ Sources↓	D_1	D_2	D_3	D_4	Supply
O_1	6	8 (5)	8	5 (25)	30
O_2	5 (35)	11 (5)	9	7	40
O_3	8	9 (18)	7 (32)	13	50
Demand	35	28	32	25	

Is this solution optimal? If not find optimal solution using MODI method.

4. Obtain initial basic feasible solution using VAM for the following transportation problem.

Markets→ Sources↓	D_1	D_2	D_3	Supply
O_1	16	20	12	200
O_2	14	8	18	160
O_3	26	24	16	90
Demand	180	120	150	

5. Construct one case study from business where transportation problem may be applied.

UNIT 4: Assignment Problem (A. P.)

A) Questions for 1 mark

I] Choose the correct alternative

1. Which of the following is used to come up with a solution to the assignment problem?

A. MODI method

B. northwest corner method

C. stepping-stone method

D. Hungarian method

2. To obtain optimum solution of Assignment Problem (AP), the number of horizontal or vertical lines and order of matrix should be

A. Different

B. Same

C. Lines are less than order of Matrix

D. Lines are greater than order of Matrix

3. Every basic feasible solution of an assignment problem (AP), having a square pay-off matrix of order n should have assignments equal

A. 2n

B. n+1

C. n

D. 2n-1

4 marking assignments, which of the following should be preferred?

a. Only row having single zero
b. Only column having single zero
c. Only row/column having single zero
d. Column having more than one zero

5. An assignment problem is a particular case of _____.

a. transportation Problem
b. assignment Problem
c. travelling salesman problem
d. replacement Problem

6. The assignment problem is always a _____matrix.

a. circle
b. square
c. rectangle
d. triangle

7.In an assignment problem involving 5 workers and 5 jobs, total number of assignments possible are _____.

a. 5
b. 10
c. 15
d. 20

8. The assignment problem is a special case of transportation problem in which _____.

a. number of origins are less than the number of destinations
b. number of origins are greater than the number of destinations
c. number of origins are greater than or equal to the number of destinations
d. number of origins equals the number of destinations

9.Maximization assignment problem is transformed into a minimization problem by_____.

a. adding each entry in a column from the maximum value in that column
b. subtracting each entry in a column from the maximum value in that column
c. subtracting each entry in the table from the maximum value in that table
d. adding each entry in the table from the maximum value in that table

II] State whether the following statements are True or False:

1. Transportation problem is general case of the assignment problem.
2. Assignment problem is applied only for minimization problem.
3. Hungarian method always gives unique optimal solution in assignment problem.
4. Hungarian method gives alternate solutions in assignment problem.
5. Assignment problem is particular case transportation problem
6. To obtain optimum solution of Assignment Problem (AP), the number of horizontal or vertical lines and order of matrix should be same.

III] Answer the following (1 mark each)

A) Define the following:

1. Optimum solution
2. Assignment
3. Balance T. P.
4. Unbalance T. P.
5. Destination

B) Question of 2 marks

1. State the relation between assignment problem and transportation problem.
2. Is there exists unique solution in assignment problem?
3. How we can obtain optimal solution if there does not exists unique solution in assignment problem?
4. State any two real life situations from business where assignment problem may be used.

C) Questions for 4 marks

1. Explain the Hungarian method to find the optimal solution in assignment problem for minimization.

2. Explain the Hungarian method to find the optimal solution in assignment problem for maximization.

3. Explain the how assignment problem is particular case of transportation problem.

4. A company has four jobs to be done. The following matrix shows the time (in days) taken on 4 different machines. Find minimum solution so as to minimize the total time required.

	M1	M2	M3	M4
A	8	10	17	9
B	3	8	5	6
C	10	12	11	9
D	6	13	9	7

D) Questions for 6 marks

1. Solve the minimal assignment problem whose effectiveness matrix is:

	1	2	3	4
I	2	3	4	5
II	4	5	6	7
III	7	8	9	8
IV	3	5	8	4

Is there unique solution?

2. There are 5 jobs to be assigned one each to 5 machines and the associated cost matrix as follows:

Jobs\ Machines→	1	2	3	4	5
A	11	17	8	16	20
B	9	7	12	6	15
C	13	16	15	12	16
D	21	24	17	28	26
E	14	10	12	11	15

Find the assignment to minimize the cost.

3. 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.

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

4. Solve the maximize assignment problem whose effectiveness matrix is:

	1	2	3	4
I	2	3	4	5
II	4	5	6	7
III	7	8	9	8
IV	3	5	8	4

5. Construct one case study from business where assignment problem may be applied.

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