Total No. of Questions : 6]

SEAT No. :

PB1328

[Total No. of Pages : 5

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S.Y.B.Com.
246 (F) : BUSINESS STATISTICS - II
(2019 Pattern) (Semester - IV)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Q.No 1 and Q.No 6 are compulsory.***
2) ***Solve any three question from remaining Q.No 2, 3, 4 and 5.***
3) ***Figures to the right indicates full marks.***
4) ***Use of calculator and statistical table is allowed.***
5) ***Symbols have their usual meanings.***

Q1) A) Choose the correct alternative in each of the following (any five). **[5×1=5]**

a) Secular trend in time series is of nature _____.

i) Increasing ii) Decreasing
iii) Stagnant iv) All the above

b) In time series analysis the method of moving averages, is used to estimate _____.

i) Trend ii) Seasonal variations
iii) Cyclical variations iv) Irregular variations

c) In a L.P.P. functions to be maximized or minimized are called _____.

i) Constraints ii) Objective function
iii) basic solution iv) Feasible solution

d) The assignment problem is always a _____matrix.

i) Square ii) Rectangle
iii) Triangle iv) Circle

e) When the total no.of demand is equal to total no.of supply then the transportation problem is said to be _____.

i) Balanced ii) Unbalanced
iii) Minimization iv) Maximization

P.T.O.

f) The solution to a transportation problem with m - sources and n - destinations is feasible if the no.of allocations are _____.

i) m+n ii) m-n

iii) mn iv) m+n-1

B) State whether following statements are true or false (any five). **[5×1=5]**

a) Seasonal variations have period less than one year.

b) The observations in time series are independent of each other.

c) The graphical method of solving L.P.P. can be used when the objective function contains only two variables.

d) A L.P.P. may have more than one solution giving the same optimum value of the problem.

e) A feasible solution is said to be optimal if it minimizes the total transportation cost.

f) Assignment problem is a special type of transportation problem.

Q2) Attempt <u>each</u> of the following: **[3×5=15]**

a) Define 'time series' and give illustrations of time series from various fields. State four components of time series.

b) Fit a trend line of the following time series by the least square method.

Year (t)	2018	2019	2020	2021	2022
Production (Y) (in lakh tons)	12	20	28	32	50

Obtain the trend value of production for 2024.

c) Estimate the trend using 10% smoothing constant for the following time series.

Year(t)	1	2	3	4	5	6	7	8	9	10	11	12
National income (in crores yt)	260	270	275	300	310	315	300	290	310	320	335	380

Q3) Attempt each of the following: **[3×5=15]**

a) Define L.P.P., Unbounded solution, basic feasible solution, alternate solution.

b) Write the standard form of the following L.P.P.

$$\text{Minimize } z = x_1 + 3x_2 = 2x_3$$

Subject to the constraints

$$3x_1 - x_2 + 3x_3 \le 7$$
$$-2x_1 + 4x_2 \le 12$$
$$-4x_1 + 3x_2 + 8x_3 \ge -20$$
$$x_1, x_2, x_3 \ge 0$$

c) Write the dual of the following L.P.P.

$$\text{Minimize } z = 4x_1 + 7x_2 + 3x_3$$

Subject to the constraints

$$13x_1 + 4x_2 + x_3 \ge 10$$
$$-4x_1 - 3x_2 + 2x_3 \le -5$$
$$x_1 - 2x_2 - 3x_3 \le -1$$
$$3x_1 + 2x_2 + 2x_3 \ge 5$$
$$x_1, x_2, x_3 \ge 0$$

Q4) Attempt each of the following: **[3×5=15]**

a) Define transportation problem, balanced and unbalanced transportation problem.

b) Obtain an initial basic feasible solution of the following transportation problem using matrix minima method.

Destination → Origin ↓	D_1	D_2	D_3	D_4	Supply
01	5	3	6	2	18
02	4	7	9	1	37
03	3	4	7	5	35
Demand	15	16	34	25	

Also find the corresponding transportation cost.

c) Obtain an initial basic feasible solution of the following transportation problem using north west corner method.

Destination → Origin ↓	W_1	W_2	W_3	Supply
01	5	6	9	30
02	12	10	11	35
Demand	20	20	20	

Also find the corresponding transportation cost.

Q5) Attempt <u>each</u> of the following: **[3×5=15]**

a) Describe mathematical model for assignment problem, explain the concept of minimization and maximization.

b) Solve the minimal assignment problem who 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

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

	M1	M2	M3	M4
A	1	4	6	3
B	9	7	10	9
C	4	5	11	7
D	8	7	8	5

Q6) Write short notes on the following: (any three) **[3×5=15]**

a) Distinguish between seasonal and cyclical variations in time series.

b) Exponential smoothing.

c) Canonical and standard form of L.P.P.

d) Optimal solution using MODI method.

e) Hungarian method to solve assignment problem.