Total No. of Questions : 6]

SEAT No. : ____

PC-4998

[Total No. of Pages : 4

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

Time : 2 ½Hours] ***[Max. Marks : 70***

Instructions to the candidates:

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

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

i) The long term regular movement in a time series is called as _____
   a) Trend b) Seasonal variations
   c) Cyclical variations d) Irregular variations.

ii) A rise in prices before Diwali is an example of _____
   a) Secular trend b) Seasonal variations
   c) Cyclical variations d) Irregular variations

iii) Every L.P.P. is associated with another L.P.P. is called_____
   a) Primal b) Duel
   c) Non - linear programming d) None of the above

iv) The solution to a transportation problem with m- sources and n-destinations is feasible if the no. of allocations are_____
   a) mn b) m+n
   c) m+n –1 d) m – n

v) If the primal problem has 3 constraints and 4 variables then the no. of constraints in the dual problem is _____
   a) 3 b) 4
   c) 7 d) 12

vi) For solving an assignment problem, which method is used?
   a) Least cost method b) Hungarian method
   c) VAM d) MN method

B) State whether the following statements are true or false (Any five):

[5 × 1 = 5]

i) Irregular variations are predictable in the analysis of time series.

ii) A solution x to the general L.P.P. is called feasible solution if it satisfies non-negativity constraints.

iii) Short term fluctuations in time - series is known as seasonal variation.

iv) Every L.P.P. is associated with another L.P.P. is called the 'dual'of the problem.

v) In transportation problem a feasible solution is said to be optimal if the total transportation cost is zero.

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

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

a) Explain the concepts of additive and multiplicative models in the analysis of time series. Compare there utility.

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

Year (t)	2015	2016	2017	2018	2019
Production (yt) (in lakh tons)	12	20	28	32	50

Estimate production for 2022 & 2024.

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

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

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

a) Define L.P.P., Explain the real life situations from business where simplex method may be used.

b) Obtain dual of the following L.P.P.

Minimize $z = > x_1 + 3x_2 + 8x_3$

Subject to $8x_1 + 2x_2 + x_3 \geq 3$

$3x_1 + 6x_2 + 4x_3 \geq 4$

$4x_1 + x_2 + 5x_3 \geq 7$

$x_1, x_2, x_3 \geq 0$

c) Obtain the cannonical from of the following L.P.P.

Maximize $Z = 16 x_1 + x_2$

Subject to $x_1 + 2x_2 \leq 10$

$2x_1 + 3x_2 \geq 11$

$x_1 + x_2 \geq 4$

$x_1, x_2 \geq 0$

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

a) Explain the MODI method for obtaining optimal solution of given transportation problem.

b) Obtain intial basic feasible solution using north- west corner method for the following transportation problem.

Destination → Origin ↓	D_1	D_2	D_3	D_4	Supply
O1	1	2	1	4	30
O2	4	2	5	9	50
O3	20	40	30	10	20
Demand	20	40	30	10	100

Hence find the corresponding transportation cost.

c) Obtain initial basic feasible solution of the following transportation problem by matrix minima method.

Destination → Origin ↓	D_1	D_2	D_3	D_4	Supply
O1	30	25	40	20	100
O2	29	26	35	40	250
O3	31	33	37	30	150
Demand	90	160	200	50	

Hence find the corresponding transportation cost.

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

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

b) What is an unbalanced assignment problem ? How to make such problem balanced?

c) 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:

Airplanes	Cargo Consignments		
	C_1	C_2	C_3
A_1	1	4	5
A_2	2	3	3
A_3	3	1	2

Q6) Attempt any three of the following : **[3 × 5 = 15]**

a) Discuss long term and short term fluctuations in analysis of time series.

b) Discuss the four Components of time series.

c) Unbounded solution, basic feasible solution, alternate solution in L.P.P.

d) Balanced and unbalanced transportation problem.

e) Hangarian method to solve assignment problem.