Total No. of Questions : 6

SEAT No. :

PD-917

[Total No. of Pages : 4

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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) ***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 their usual meaning.***

Q1) A) Choose the correct alternative in each of the following (Any five)

[5 × 1 = 5]

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

a) Trend b) Seasonal variations

c) Cyclical variations d) Irregular Variations

ii) In time series analysis least square method _____.

a) reduces the calculations

b) is subjective

c) reduces the sum of squares of errors

d) does not give estimate for future

iii) The cost of slack variable is _____.

a) 0 b) –1

c) 1 d) 2

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

a) constraints b) basic solution

c) feasible solution d) objective function

P.T.O.

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) Which of the following is used to come up with solution to the assignment problem?

a) MN method b) NW method

c) MODI method d) Hangarian method

B) State whether the following statements are true or false (Any Five) **[5 × 1 = 5]**

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

ii) When the components in time series are independent then additive model is suitable.

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

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

v) In assignment problem all elements of dummy rows or dummy columns may not be zero.

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

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

a) Distinguish between seasonal variations and cyclical variations with an illustrations.

b) Compute 3-yearly moving averages for the following data.

Year (t)	1998	1999	2000	2001	2002	2003	2004	2005
Production (y_t) (in tonnes)	78	73	71	73	75	78	73	77

c) Fit a straight line trend by the method of least squares to the following data :

Year (t)	2015	2016	2017	2018	2019
Production (y_t) (in tonnes)	14	11	13	15	16

Hence estimate production for the year 2021.

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

a) Define L.P.P., Cannonical and standard form of L.P.P.

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

Minimize $Z = 17x_1 + 13x_2 + 18x_3$

Subject to $18x_1 + 12x_2 + x_3 \geq 13$

$13x_1 + 16x_2 + 14x_3 \geq 14$

$14x_1 + x_2 + 15x_3 \geq 11$

$x_1 + 15x_2 + 12x_3 \geq 17$

$x_1, x_2, x_3 \geq 0$

c) Obtain initial simplex table for L.P.P.

Maximize $Z = 5x_1 + 3x_2$

Subject to $x_1 + x_2 \leq 2$

$5x_1 + 2x_2 \leq 10$

$3x_1 + 8x_2 \leq 12$

$x_1, x_2 \geq 0$

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

a) Obtain Initial basic feasible solution using North-West Corner method for the following transportation problem.

Market→ Sources↓	D_1	D_2	D_3	Supply
01	5	1	8	12
02	2	4	0	14
03	3	6	7	4
Demand	9	10	11	30

Hence find the corresponding total transportation cost.

b) Explain how to convert maximization of transportation problem into minimization of transportation problem.

c) Obtain an initial basic feasible solution for the following transportation problem using VAM.

	D_1	D_2	D_3	D_4	Supply
O_1	2	3	11	7	6
O_2	1	0	6	1	1
O_3	5	8	15	9	10
Demand	7	5	3	2	

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

a) Solve following assignment problem to minimize the cost

Machines

		M_1	M_2	M_3	M_4
	J_1	5	7	11	6
Jobs	J_2	8	5	9	6
	J_3	4	7	10	7
	J_4	10	4	8	3

b) Describe the procedure of Hangarian method to solve the assignment problem.

c) Solve the following assignment problem for maximization.

Machines

		I	II	III	IV
	A	1	8	4	1
Jobs	B	5	7	6	2
	C	3	5	4	2
	D	3	1	6	2

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

a) Explain how to fit Autoregressive model of order 1 (AR(1)).

b) Discuss the four components of time series.

c) Basic feasible solution, alternate solution, degenerate solution in simplex method.

d) Balanced and unbalanced transportation problem.

e) Write an algorithm to solve assignment problem for optimal cost.