

Total Pages : 9

**UDHA (Sem-II)—Math
(CC-4)**

2019

Full Marks : 70

Time : 3 hours

Answer from **all the Sections** as directed.

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

SECTION—I

1. Choose the *correct* answer :

2 × 10

(i) The correlation coefficient lies between

(a) -1 and +1

(b) 0 and 1

(c) -1 and 0

(d) 1 and 1.5

(2)

(ii) Correlation coefficient is the _____ between regression coefficients

(a) Arithmetic mean

(b) Geometric mean

(c) Harmonic mean

(d) None of these

(iii) Coefficient of skewness is given by

(a) $\frac{Q_3 - Q_1 - 2 \text{ Med}}{Q_3 - Q_1}$

(b) $\frac{Q_3 + Q_1 - 2 \text{ Med}}{Q_3 - Q_1}$

(c) $\frac{Q_3 + Q_1}{Q_3 - Q_1}$

(d) $\frac{Q_3 - Q_1 + 2 \text{ Med}}{Q_3 - Q_1}$

(iv) If r is the coefficient of correlation and $r = 0$ then the two lines of regression are

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

(3)

- (a) Parallel to each other
 - (b) Perpendicular to each other
 - (c) Coincides
 - (d) None of these
- (v) If one of the regression coefficient is greater than unity then other must be
- (a) Greater than unity
 - (b) Less than unity
 - (c) Equal to unity
 - (d) None of these
- (vi) In R^n (i.e. n -dimensional space) the set of points $x = (x_1, x_2, \dots, x_n)$ satisfying the equation $c_1x_1 + c_2x_2 + \dots + c_nx_n = k$; (not all $C_i = 0$) is called
- (a) Convex set
 - (b) Hyper plane
 - (c) Convex combination
 - (d) Convex hull

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

(4)

(vii) The transportation problem to minimise the total cost $Z = \sum_{i=1}^m \sum_{j=1}^n C_{ij}x_{ij}$ subject to the constraints $\sum_{j=1}^n x_{ij} = a_i, \sum_{i=1}^m x_{ij} = b_j, x_{ij} \geq 0$ is called unbalanced transportation problem if

(a) $\sum_{i=1}^m a_i = \sum_{j=1}^n b_j$

(b) $\sum_{i=1}^m a_i \neq \sum_{j=1}^n b_j$

(c) $\sum_{i=1}^m \sum_{j=1}^n a_i b_j = 0$

(d) $\sum_{i=1}^m a_i = 0, \sum_{j=1}^n b_j = 0$

(viii) While the primal problem has n variables and m constraints then dual has

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

(5)

(6)

- ✓ (a) m variables, n constraints
- (b) n variables, m constraints
- (c) m variables, $n + 1$ constraints
- (d) $m + 1$ variables, n constraints

(ix) The constraint $2x_1 - 3x_2 \leq 5$ can be changed to equation $2x_1 - 3x_2 + x_3 = 0$. Then x_3 is called

- ✓ (a) Slack variable
- (b) Surplus variable
- (c) Basic variable
- (d) None of these

(x) The extreme points of the convex set of feasible solutions are

- (a) Infinite in number
- (b) Finite in number
- (c) May be finite or may be infinite
- ✓ (d) None of these

SECTION-II

Answer any four questions selecting at least

one from each Group : 5 × 4

Group—A

2. Prove that sphere is a convex set.

https://www.jharkhandstudy.com

3. ✓ Solve the L.P.P graphically, find the maximum value of $Z = 3x_1 + 2x_2$ subject to constraints

$$2x_1 - x_2 \geq 2$$

$$x_1 + 2x_2 \leq 8$$

$$x_1, x_2 \geq 0$$

4. Prove that the necessary and sufficient condition for the existence of a feasible solution to

the transportation problem is that $\sum_{i=1}^m a_i = \sum_{j=1}^n b_j$.

Symbols have their usual meaning.

5. Define dual problem.

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

https://www.jharkhandstudy.com

(7)

Group—B

6. Fit a straight line to the following data treating y as the dependent variable.

x	1	2	3	4	5
y	5	7	9	10	11

7. Calculate the coefficient of correlation between the values of x and y given below :

x	78	89	97	69	59	79	68	61
y	125	137	156	112	107	136	123	108

8. Show that $2x + 3y$ and $4x + 9y$ are uncorrelated if $8\sigma_x^2 + 30\rho\sigma_x\sigma_y + 27\sigma_y^2 = 0$.

9. Prove that the modulus value of the arithmetic mean of the regression coefficient is not less than the modulus value of correlation coefficient ρ .

SECTION—III

Answer any two questions selecting at least

one from each Group : 15 × 2

Group—C