SARDAR PATEL UNIVERSITY

Master of Computer Applications - II ATKT Semester Examination
PS02FMCA01 : Statistical and Optimization Techniques
22ND October 2018, Monday

Time: 10 AM to 1 PM   Marks: 70

Q1.   Select the most appropriate answer of the following questions: 8

(i)   The mode of a set of numbers 4,5,6,4,2,3,4,7,6,4,2 is _____ .
(a) 2   (b) 4   (c) 6   (d) 7

(ii)   Which of the following is not a measure of central tendency?
(a) Arithmetic mean (b) Median   (c) Quartile   (d) Standard Deviation

(iii)   Which of the following divides a group of data into four equal parts?
(a) Median   (b) Quartile   (c) Decile   (d) Percentile

(iv)   A bar chart constructed in which, area of each bar is proportional to number of items in each group is known as
(a) Pi-chart   (b) Polygon   (c) Histogram   (d) None of these

(v)   The Graphical method can be applied to solve a Linear Programming problem, when there are only _____ variable(s).

[A] one   [B] two   [C] three   [D] more than three

(vi)   In simplex method of Linear Programming problem, _____ variables are to be added if the constraint has '>=' sign.
[A] Slack   [B] Surplus   [C] Artificial   [D] None of these

(vii)   The number of non-negative variables in a basic feasible solution to m X n transportation problem is _____
[A] $m + n - 1$ [B] $m + n + 1$ [C] $m + n$ [D] None of these

(viii)   In simplex procedure, if corresponding to any negative Δ_j, all elements of the column X_j <= 0, then the solution under test _____ solution.
[A] Is Optimal   [B] has unbounded   [C] has Alternative   [D] None of these

Q2.   Answer the following questions: [Any SEVEN]   14
(i)   Define the terms: Statistics and Correlation

(ii)   Find the standard deviation for the set of numbers 12, 6, 7, 3, 15, 10, 18 and 5.

(iii)   State the empirical relationship between
        (a) Mean, Media and Mode and
        (b) Standard deviation , Mean deviation and Semi Inter Quartile Range.

(iv)   Write the name of the methods for estimation of trend.

(v)   Write the steps to solve linear programming problem (LPP) using graphical method.

(vi)   Write the usage of sensitivity analysis

(vii)   What do you mean by Integer Programming Problem?

(viii)   Write the mathematical form of Assignment problem.

(ix)   Define the term Operation research and discuss the role of computer in it.

Q3 A. Fit the least-square line to the data given in below table, by considering X as dependent variable.   6

X:	3	5	6	8	9	11
Y:	2	3	4	6	5	8

B. Find Arithmetic Mean, Median and Mode for the following data: 6

Marks	0-10	10-20	20-30	30-40	40-50
Frequency	22	38	46	35	20

OR

B. Find Mean deviation and Standard deviation for the following data: 6

Marks	0-10	10-20	20-30	30-40	40-50
Frequency	22	38	46	35	20

Q4 A. Write a note on time series analysis.   6

B. Write a Program / an algorithm to find the arithmetic mean of a given frequency distribution.   6

OR

B. Find the coefficient of correlation between the variables X and Y presented in the following table: 6

X:	3	5	6	8	9	11
Y:	2	3	4	6	5	8

Q5 A. Use simplex method to solve the following LPP: 6
Maximize $Z = 3x1 + 2x2$
Subject to the constraints
$x1 + x2 <= 4$
$x1 - x2 <= 2$
and $x1, x2 >= 0$

B. Determine an initial feasible solution to the following transportation problem using Vogel's Approximation method & find the optimal solution.   6

Warehouse/ Factory	W_1	W_2	W_3	W_4	Available
F_1	(19)	(30)	(50)	(10)	7
F_2	(70)	(30)	(40)	(60)	9
F_3	(40)	(8)	(70)	(20)	18
Requirements	5	8	7	14	

OR

B. Formulate the problem as **Linear Programming Problem** and find its solution.   6

A firm manufactures two types of products X and Y and sells at a profit of Rs. 20 and Rs. 30 respectively. Each product is processed on TWO machines A and B. Type X requires 1 minute of processing time on A and 2 minutes of processing time on B; type Y requires 1 minute on A and 1 minute on B. The machine A is available for not more than 8 hours while B is for 15 hours during any working day.

Q6 A. A departmental head has four subordinates and four tasks to be performed. The subordinate differ in efficiency, and he tasks differ in their intrinsic difficulty. His estimate, of the time each man would take to perform each task, is given in the matrix below: 6

Tasks	Subordinates			
	A	B	C	D
I	8	26	17	11
II	13	28	4	26
III	38	19	18	15
IV	19	26	24	10

How should the tasks be allocated, one to a man, so as to minimize the total man-hours?

B. There are five jobs each of which must go through the two machines A and B in the order AB. Processing times are as follow. Determine a sequence for five jobs that will minimize the elapsed time.   6

JOB	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

OR

B. **Do as directed.**   6
     i.   Write short note on Dynamic programming approach.
     ii.   What do you mean by degeneracy in transportation problem?
     iii.   How can you maximize an objective function in the assignment problem?

— X —

③