

Programme: ADSCM

Academic year: 2011 – 2012

Semester: I

Subject: Quantitative Techniques

Course Old

Marks 70

Date: 29.12.2011

Time: 11.00 a.m. to 2.00 p.m.

**Instructions:**

Candidates should read carefully the instructions printed on the question paper and on the cover of the Answer book, which is provided for their use. Figure in brackets indicates full marks.

**Q.1. Attempt any 2 out of 4**

(10 Marks)

a. Solve the following equations using determinant

$$2x - y + 3z = 4$$

$$x + y + z = 2$$

$$3x + y - z = 2$$

b. if  $A = \begin{bmatrix} 2 & -3 & 1 \\ 4 & 2 & 3 \end{bmatrix}$  and  $B = \begin{bmatrix} 3 & -2 & 4 \\ 1 & 3 & -5 \end{bmatrix}$

Show that  $(A+B)^T = A^T + B^T$ , where T denote the transpose of the matrix.

c. Determine the co-ordinates and nature of any turning point on the curve

$$y = x^3 + 7.5x^2 + 18x + 6$$

d. The probability that a contractor will get a plumbing contract is  $\frac{2}{3}$ , and the probability that he will not get an electric contract is  $\frac{5}{9}$ . If the probability of getting at least one contract is  $\frac{4}{5}$ . What is the probability that he will get both?

**Q.2 Attempt any two out of the three**

(10 Marks)

a. What are the 6 desirable qualities of a good average and hence verify the merits and demerits of the following averages on the basis of these qualities.

(i) Arithmetic Mean, (ii) Median (iii) Mode

b. Explain the following measures used in statistics

(i) Coefficient of variations

(ii) Measures of Skewness

(iii) Mathematical Expectation

(iv) Poisson Probability Distribution

(v) Properties of Normal Distribution

c. Describe the following OR Techniques

- (i) Assignment problems
- (ii) Transportation problems
- (iii) Linear Programming Problems

**Q.3. Attempt any one of the following**

**(30 Marks)**

a. A manufacturing organization has two factories  $F_1$  and  $F_2$  located at two different cities. The centralized planning cell has to decide on allocations of orders from three markets to the factories with a view to minimizing the over all cost to the organization. The demand, capacity and cost are given below

Factory	Market			Capacity
	$M_1$	$M_2$	$M_3$	
$F_1$	25	17	22	300
$F_2$	15	12	19	500
Demand $\rightarrow$	300	300	500	

Determine the optimum schedule for the transportation problems using Vogel Approximation Method

b. Three different aeroplanes are to be assigned to handle three cargo consignments with a view to maximize profit. The profit matrix (in lakhs of Rs.) is as follows:

Aeroplanes	Cargo Consignment		
	$C_1$	$C_2$	$C_3$
A1	1	4	5
A2	2	3	3
A3	3	1	2

How should the cargo consignments be assigned to aeroplanes to maximize the profit.

**Q.4. Attempt any one of the following**

**(20 Marks)**

a. The following table gives the aptitude test scores and productivity index of 10 workers Selected at random.

Aptitude Score (X)	60	62	65	70	72	48	53	73	65	82
Productivity Index (Y)	68	60	62	80	85	40	52	62	60	81

Obtain the two regression equations and estimate

- (i) The productivity index of a worker whose test score is 92.
- (ii) The test score when productivity index is 75.

b. A new treatment for baldness is known to be effective in 70% of the cases treated.

Four bald members from different families are treated. Find the probability that

- (i) Exactly two members are successfully treated. (7)
- (ii) Atleast one member is successfully treated (7)
- (iii) All are successfully treated. (6)