

AMIETE – ET/CS/IT {New Scheme}

Time: 3 Hours

December 2016

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Objective of linear programming for an objective function is to
 (A) Maximize or Minimize (B) Subset or proper set modeling
 (C) Row or Column Modeling (D) Adjacent Modeling
- b. For a linear programming equations, convex set of equations is included in regions of
 (A) Feasible Solution (B) Disposed Solution
 (C) Profit Solutions (D) Loss Solutions
- c. Linear programming is used to optimize mathematical procedure and it is
 (A) Subset of mathematical programming
 (B) Dimension of mathematical programming
 (C) Linear Mathematical Programming
 (D) All of these
- d. The assignment model is a special case of the _____ model.
 (A) Maximum-flow (B) Transportation
 (C) Shortest-route (D) None of these
- e. In a balanced transportation model where supply equals to demand,
 (A) All constraints are equalities (B) None of the constraints are equalities
 (C) All constraints are inequalities (D) None of the constraints are inequalities
- f. An assignment problem is a special form of transportation problem where all the supply and demand values are equal to
 (A) 0 (B) 1
 (C) 2 (D) 3
- g. PERT and CPM
 (A) Are most valuable when a small number of activities must be scheduled.
 (B) Have different features and are not applied to the same situation.
 (C) Do not require a chronological relationship among activities.
 (D) Have been combined to develop a procedure that uses the best of each.
- h. Arcs in a project network indicate
 (A) Completion times (B) Precedence Relationship
 (C) Activities (D) The critical path

- i. Time between two successive requests arriving is called
 (A) Interarrival time (B) Arrival time
 (C) Poisson Distribution (D) Average residual service time
- j. One of the most widely used exponential distributions is called a
 (A) Possible distribution (B) Passion distribution
 (C) Poisson association (D) Poisson distribution

PART A

Answer any THREE Questions. Each question carries 16 marks.

- Q.2** a. A chemical company produces two products, X and Y. Each unit of product X requires 3 hours on operation I and 4 hours on operation II, while each unit of product Y requires 4 hours on operation I and 5 hours on operation II. Total available time for operation I and II is 20 hours and 26 hours respectively. The production of each unit of product Y also results in two units of a by-product Z at no extra cost.

Product X sells at profit of Rs.10/unit, while Y sells at profit of Rs.20/unit. By product Z brings a unit profit of Rs.6 if sold, in case it cannot be sold, the destruction cost of Rs.4/unit. Forecasts indicate that not more than 5 units of Z can be sold. Formulate the L-P model to determine the quantities X and Y to be produced, keeping Z in mind, so that the profit earned is maximum. (8)

- b. Write the dual corresponding to

$$\text{Max } z = 5x_1 + 8x_2 + 10x_3$$

$$\text{Subject to: } x_1 + x_2 + 2x_3 \leq 120$$

$$3x_1 - 2x_2 - x_3 \geq 90$$

$$2x_1 + 4x_2 + 2x_3 = 100$$

$$x_1, x_2, x_3 \geq 0$$

Use Simplex Method and obtain the zeroth and first iterates of the dual. (4+4)

- Q.3** a. Solve the following LPP by Simplex Method (8)

$$\text{Max } z = x_1 + 2x_2 + 3x_3 - x_4$$

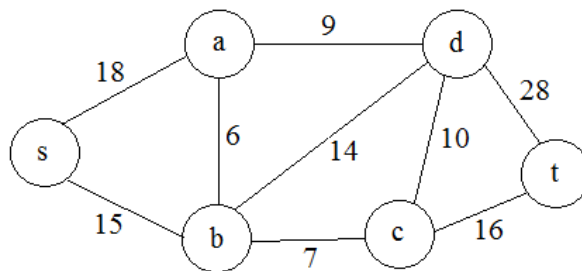
$$\text{Subject to: } x_1 + 2x_2 + 3x_3 = 15$$

$$2x_1 + x_2 + 5x_3 = 20$$

$$x_1 + 2x_2 + x_3 + x_4 = 10$$

$$x_1, x_2, x_3, x_4 \geq 0$$

- b. Apply Dijkstra's algorithm to find the shortest route from (s) to (t) in the network given below:



Q.4 a. Determine the optimal basic solution to the following transportation problem (8)

	D ₁	D ₂	D ₃	D ₄	a _i
O ₁	2	3	11	7	6
O ₂	1	0	6	1	1
O ₃	5	8	15	9	10
	7	5	3	2	

b. Solve the following game by using the principle of dominance method: (8)

Player B

		I	II	III	IV	V	VI
Player A	1	4	2	0	2	1	1
	2	4	3	1	3	2	2
	3	4	3	7	-5	1	2
	4	4	3	4	-1	2	2
	5	4	3	3	-2	2	2

Q.5 a. A branch of Panjab National Bank has only one typists. Since the typing work varies in length (no. of pages to be typed), the typing rate is randomly distributed approximating a poisson distribution with mean service rate of 8 letters per hour. The letters arrive at a rate of 5 per hour during the entire 8-hour workday. If the typewriter is valued at Rs.1.50 per hour, determine (8)

- (i) Equipment utilization
- (ii) The percent time that an arriving letter has to wait
- (iii) Average system time
- (iv) Average cost due to waiting on the part of typewriters i.e. it remains idle

b. Tasks A, B, C, ..., H, I constitute a project. The precedence relationships are A < D; A < E; B < F; D < F; C < G; C < H; F < I; G < I

Draw a network to represent the project and find the minimum time of completion of the project when time, in days, of each task is as follows:

Task :	A	B	C	D	E	F	G	H	I
Time :	8	10	8	10	16	17	18	14	9

Also identify the critical path. (8)

Q.6 a. Find the range of values of 'p' & 'q' which will render the entry (2, 2), the saddle point for the game (4)

		Player B		
		I	II	III
Player A	I	2	4	5
	II	10	7	q
	III	4	p	8

b. Define Pure Strategy and Mixed Strategy. (4)

c. Solve the given assignment problem

160	130	175	190	200
135	120	130	160	175
140	110	155	170	185
50	50	80	80	110
55	35	70	80	105

PART B

Answer any TWO Questions. Each question carries 16 marks.

- Q.7** a. Define management and administration. Write down the key difference between management and administration. (8)
- b. Write down the Fayol's 14 principles of Management and five elements of management. (8)
- Q.8** a. Briefly describe the requirement of a good planning. (8)
- b. Briefly describe the different types of decisions. (8)
- Q.9** a. What are the techniques that may be used to improve the motivation? (8)
- b. Discuss the process of Financial Controls. (8)