

AMIETE – ET/CS/IT (Current Scheme)

Time: 3 Hours

June 2019

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. Selecting THREE questions from part A and TWO questions from part B.
- 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. For any primal problem and its dual
 - (A) optimal value of objective function is same
 - (B) Primal will have an optimal solution iff dual does too
 - (C) both primal and dual cannot be infeasible
 - (D) All of these

- b. The entering variable in the sensitivity analysis of objective function coefficients is always a
 - (A) decision variable
 - (B) non basic variable
 - (C) basic variable
 - (D) slack variable

- c. The dummy source or destination in a transportation problem is added to
 - (A) satisfy rim conditions
 - (B) prevent solution from becoming degenerates
 - (C) ensure that total cost does not exceed a limit
 - (D) None of these

- d. If we were to use opportunity cost value for an unused cell to test optimality, it should be
 - (A) equal to zero
 - (B) most negative number
 - (C) most positive number
 - (D) any value

- e. Maximization assignment problem is transformed into a minimization problem by
 - (A) adding each entry in a column from the maximum value in that column
 - (B) subtracting each entry in a column from the maximum value in that column
 - (C) subtracting each entry in the table from the maximum value in that table
 - (D) Any one of these

- f. Decision-maker's knowledge and experience may influence the decision-making process when using the criterion of
 - (A) maximax
 - (B) minimax regret
 - (C) realism
 - (D) maximin

- g. The concept of utility is used to
 (A) measure the utility of money (B) take into account aversion of risk
 (C) Both (A) and (B) (D) None of these
- h. What happens when maximin and minimax values of the game are same?
 (A) no solution exists (B) solution is mixed
 (C) saddle point exists (D) None of these
- i. The another term commonly used for activity slack time is
 (A) total float (B) free float
 (C) independent float (D) All of these
- j. Which cost can vary with order quantity
 (A) unit cost only (B) re-order cost only
 (C) holding cost only (D) All of these

PART A

Answer any THREE Questions. Each question carries 16 marks.

Q.2 a. What is dummy activity, and when it is used in a network? (4)

b. A small project consists of seven activities, the details of which are given below:

Activity	Predecessor Activity	Duration (in Day)		
		Most likely	Optimistic	Pessimistic
A	--	3	1	7
B	A	6	2	14
C	A	3	3	3
D	B, C	10	4	22
E	B	7	3	15
F	D, E	5	2	14
G	D	4	4	4

Draw the network diagram and find the critical path. What project duration will have 95% confidence of completion? (12)

Q.3 Define impossible assignment and negative assignment with an example. The owner of a small machine shop has four machines available to assign jobs for the day. Five jobs are offered with the expected profit in rupees for each machine on each job being as follows:

		Job				
		A	B	C	D	E
Machine	1	6.20	7.80	5.00	10.10	8.20
	2	7.10	8.40	6.10	7.30	5.90
	3	8.70	9.20	11.10	7.10	8.10
	4	4.80	6.40	8.70	7.70	8.00

Find the assignment of machines to jobs that will result in a maximum profit. (16)

Q.4 a. Solve the following LPP by graphical method (10)

$$\text{Minimize } z = 3x_1 + 5x_2$$

Subject to

$$-3x_1 + 4x_2 \geq 12$$

$$x_1 \leq 4$$

$$2x_1 - x_2 \geq -2$$

$$x_2 \geq 2$$

$$2x_1 + 3x_2 \geq 12$$

$$x_1, x_2 \geq 0$$

b. Discuss few applications of Operations Research (6)

Q.5 a. Write dual of following LPP (6)

$$\text{Max } z = 4x_1 + 10x_2 + 25x_3$$

Subject to

$$2x_1 + 4x_2 + 8x_3 \leq 25$$

$$4x_1 + 9x_2 + 8x_3 \leq 30$$

$$6x_1 + 8x_2 + 2x_3 \leq 40$$

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

b. Use Big-M method to maximize $Z = 6x_1 + 4x_2$ subject to the constraints $2x_1 + 3x_2 \leq 30$, $3x_1 + 2x_2 \leq 24$, $x_1 + x_2 \geq 3$, $x_1 \geq 0$, $x_2 \geq 0$. Show that the solution is unique. Find two solutions. (10)

Q.6 a. The XYZ Airport to Goa serves light aircraft. It has a single runway and one air traffic controller to land planes. It takes an airplane 12 minutes to land and clear the runway. Planes arrive at the airport at the rate of four per hour. (10)

(i) Determine the average number of planes that will stack up, waiting to land.

(ii) Find the average time a plane must wait in line before it can land.

(iii) Calculate the average time it takes a plane to clear the runway once it has notified the airport that it is in vicinity and wants to land.

(iv) The Airport authority has a rule that an air traffic controller can, on average, land planes a maximum of 45 out of every hour. There must be 15 minutes of idle time available to relieve the tension. Will this airport have to hire an extra air-traffic controller?

b. Determine expected profit with perfect information and expected value of perfect information. (6)

PART B

Answer any TWO Questions. Each question carries 16 marks.

- Q.7** a. What are various functions of Management? (8)
- b. Write a short note on financial controls and the process of control. (8)
- Q.8** a. What do you mean by strategy and the process view of organizations? (4)
- b. Briefly discuss about Demand forecasts and parametric methods for forecasting demand distributions. (12)
- Q.9** a. How is leader different from a Manager? (8)
- b. Discuss the following: (8)
- (i) Marketing Information
 - (ii) Market Segmentation