

Code: AE62/AC62/AT62 Subject: OPERATIONS RESEARCH & ENGG. MANAGEMENT
AMIETE – ET/CS/IT (Current Scheme)

Time: 3 Hours

JUNE 2015

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.

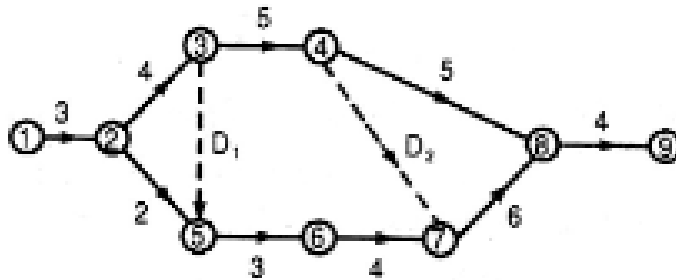
- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining 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. When slack of an activity is negative

- (A) it represents a situation where extra resources are available and the completion of project is not delayed
- (B) it represents that a programme falls behind schedule and additional resources are required to complete the project in time
- (C) the activity is critical and any delay in its performance will delay the completion of whole project
- (D) all of these

b. In a network shown in the below figure, the critical path is along



- (A) 1-2-3-4-8-9
 - (B) 1-2-3-5-6-7-8-9
 - (C) 1-2-3-4-7-8-9
 - (D) 1-2-5-6-7-8-9
- c. A diagram showing the path followed by men and materials while performing a task is known as
- (A) string diagram
 - (B) flow process chart
 - (C) travel chart
 - (D) flow diagram
- d. PERT analysis is based upon
- (A) optimistic time
 - (B) pessimistic time
 - (C) most likely time
 - (D) all of these

- e. Simplex method is the method used for
 (A) value analysis (B) network analysis
 (C) linear programming (D) queuing theory
- f. 'Payoffs' in Game Theory means
 (A) outcome of a game when different alternatives are adopted by players
 (B) no. of players involved in a game
 (C) value of a game
 (D) strategies used by players
- g. Following is an example of 'Motivation Theory'
 (A) Maxwell's Theory (B) Hertzberg's Theory
 (C) Edward's Theory (D) None of these
- h. In a functional organisation
 (A) quality of work is better
 (B) wastage of material is minimum
 (C) specialised knowledge and guidance to individual worker is provided
 (D) all of these
- i. A critical activity has
 (A) maximum slack (B) minimum slack
 (C) zero slack (D) average slack
- j. Queuing theory is associated with
 (A) inventory (B) sales
 (C) waiting time (D) production time

PART A

Answer any THREE Questions. Each question carries 16 marks.

- Q.2** a. What do you mean by 'degeneracy' and 'cycling' while solving linear programming problems? Explain. (4)
- b. Using Graphical Method, solve the following linear programming problem:
 Maximize $Z = 400X_1 + 200X_2$
 Subject to constraints:
 $18X_1 + 3X_2 \leq 800$
 $9X_1 + 4X_2 \leq 600$
 $X_2 \leq 150$
 $X_1, X_2 \geq 0$ (12)
- Q.3** a. In a linear program problem what are the properties of basic solution, explain. (4)
- b. Use Big-M method to solve the following: (12)
- Minimize $Z = 4X_1 + 3X_2$
 Subject to:
 $2X_1 + X_2 \geq 10$
 $-3X_1 + 2X_2 \leq 6$
 $X_1 + X_2 \geq 6$
 $X_1, X_2 \geq 0$

- Q.4** a. Explain “North West Corner Method” to obtain basic feasible solution. (4)
- b. In a manufacturing unit there are four machines W, X, Y and Z and four jobs A, B, C and D are to be performed. The time taken by each machine to perform job is given. Solve this as an assignment problem. (12)

	A	B	C	D
W	120	100	80	90
X	80	90	110	70
Y	110	140	120	100
Z	90	90	80	90

- Q.5** The following table lists the jobs of a network along with their time estimates. (16)

Activity	to	tm	tp
1-4	3	9	27
1-3	3	6	15
1-2	6	12	30
4-5	1	4	07
3-5	3	9	27
3-6	2	5	08
5-6	6	12	30
2-6	4	19	28

- i) Draw the project network.
- ii) What is the probability that the job will be completed in 35 days?
- iii) What due date has 90% chance of being met?
- Q.6** a. State the Operating Characteristics of Poisson-exponential single server model – infinite population. (4)
- b. At a service counter of fast-food joint, the customers arrive at the average interval of six minutes whereas the counter clerk takes on an average 5 minutes for preparation of bill and delivery of the item. Calculate the following:
- counter utilization level
 - average waiting time of the customers at the fast food joint
 - expected average waiting time in the line

- (iv) average number of customers in the service counter area
- (v) average number of customer in the line
- (vi) probability that the counter clerk is idle
- (vii) probability of finding the clerk busy
- (viii) chances that customer is required to wait more than 30 minutes in the system
- (ix) probability of having four customer in the system
- (x) probability of finding more than 3 customer in the system **(12)**

PART B

Answer any TWO questions. Each question carries 16 marks.

- Q.7** a. How Taylor's Scientific Management system is useful for the management System? Briefly explain. **(4)**
- b. What are the needs for organizational change? Also explain the barriers a manager faces in implementing the change in the organization. **(6+6)**
- Q.8** a. What are the (i) Hygiene Factors and (ii) Motivators according to the theory of Motivation? Explain. **(6)**
- b. Explain the salient features of (i) Qualitative Forecasting (ii) Judgemental Forecasting (iii) Quantitative Forecasting. **(3+3+4)**
- Q.9** a. Explain the following Objectives of Pricing:
 (i) Profit Objectives
 (ii) Volume Based Objectives
 (iii) Competitive Objectives **(10)**
- b. Draw block diagram depicting various elements of effective communication. **(6)**