

**AMIETE – ET/CS/IT (Current Scheme)**

Time: 3 Hours

**DECEMBER 2018**

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. Slack variable is added to  
(A) A constant of  $\leq$  type (B) A constant of  $\geq$  type  
(C) An equation (D) None of these
- b. Customers from a queue are selected for service according to certain rule known as  
(A) service discipline (B) queue discipline  
(C) dynamic process (D) None of these
- c. If primal of an LPP has an infeasible solution, then the dual has  
(A) no feasible solution (B) unbounded solution  
(C) feasible solution (D) None of these
- d. Game theory is the study of  
(A) selecting optimal strategy (B) resolving conflicts between player  
(C) Both (A) & (B) (D) None of these
- e. Degeneracy in transportation problem means  
(A) total supply equals total demand  
(B) few allocation become negative  
(C) solution so obtained is infeasible  
(D) dummy allocation required
- f. Network models have advantage in terms of project  
(A) Planning (B) Scheduling  
(C) controlling (D) All of these
- g. Game theory models are classified by the  
(A) number of players (B) sum of all pay-offs  
(C) number of strategies (D) All of these

- h. \_\_\_\_\_ is a special type of organization owned by users or customers to whom earnings are distributed tax free in proportion to patronage  
 (A) partnership (B) cooperatives  
 (C) corporations (D) sole proprietorship
- i. According to Maslow's need hierarchy, which one of the following is an "Esteem need"  
 (A) shelter (B) group acceptance  
 (C) self-respect (D) safe work
- j. The model developed by Max Weber for a rational and efficient large organization is termed as  
 (A) bureaucracy (B) commitment principle  
 (C) explanatory forecasting model (D) motivator factor

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**PART A**

Answer any **THREE** Questions. Each question carries 16 marks.

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- Q.2** a. Explain the characteristics of operations research. (8)
- b. Solve graphically: (8)
- Max Z = 2x<sub>1</sub> + x<sub>2</sub>**  
**Subject to x<sub>1</sub> + 2x<sub>2</sub> ≤ 10; x<sub>1</sub> + x<sub>2</sub> ≤ 6; x<sub>1</sub> - x<sub>2</sub> ≤ 2**  
**x<sub>1</sub> - 2x<sub>2</sub> ≤ 1; x<sub>1</sub>, x<sub>2</sub> ≥ 0.**
- Q.3** a. Express the following LPP in standard form: (4)
- Max Z = 3x<sub>1</sub> + 2x<sub>2</sub> + 5x<sub>3</sub>**  
**Subject to : 2x<sub>1</sub> - 3x<sub>2</sub> ≤ 3**  
 $x_1 + 2x_2 + 3x_3 \geq 5$   
 $3x_1 + 2x_3 \leq 2; x_1, x_2 \geq 0, x_3 \text{ unrestricted}$
- b. Solve by Simplex method: (12)
- Min Z = x<sub>1</sub> - 3x<sub>2</sub> + 3x<sub>3</sub>**  
**Subject to : 3x<sub>1</sub> - x<sub>2</sub> + 2x<sub>3</sub> ≤ 7**  
 $2x_1 + 4x_2 \geq -12$   
 $-4x_1 + 3x_2 + 8x_3 \leq 10; x_1, x_2, x_3 \geq 0$
- Q.4** a. Explain the penalty method for finding the initial basic feasible solution to the transportation problem. (5)

- b. Solve the following assignment problem: (11)

		Locations				
		A	B	C	D	E
Machines	1.	11	17	8	16	20
	2.	9	7	12	6	15
	3.	13	16	15	12	16
	4.	21	24	17	28	26
	5.	14	10	12	11	13

Find the assignment of machines to locations that will result in minimum cost.

- Q.5** a. Define predecessor activity, successor activity and dummy activity in Network analysis (6)
- b. The following table lists the jobs of a network along with their time estimates.

Job Activity	Duration(days)		
	Optimistic	Most likely	Pessimistic
1 - 2	5	8	10
1 - 3	18	20	22
1 - 4	26	33	40
1 - 5	16	18	20
1 - 6	15	20	25
1 - 6	6	9	12
1 - 7	7	10	12
1 - 7	7	8	9
1 - 7	3	4	5

- (i) Draw the project network  
 (ii) Calculate the expected activity time and variance  
 (iii) Determine the critical path  
 (iv) What is the probability of expected completion time of the project if the original scheduled time of completing the project is 41.5 days  
 (v) Find the due date which has 95% chance to meet (10)
- Q.6** a. Explain Dominance rule in game theory. For What values of  $\lambda$ , the game with following pay-off matrix is strictly determinable? (10)

		Player B		
Player A	$\lambda$	6	2	
	-1	$\lambda$	-7	
	-2	4	$\lambda$	

- b. A road transport company has one reservation clerk on duty at a time. He handles information of bus schedules and makes reservations. Customers arrive at rate of 8 customers per hour and the clerk can, on an average, serve 12 customers per hour. Find
- (i) the average number of customers waiting for the service of the clerk.  
 (ii) Average time a customer waits before being served (6)

**PART B**

**Answer any TWO Questions. Each question carries 16 marks.**

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- Q.7** a. Explain the different types of decisions. (8)  
b. Discuss the different legal forms of organization (8)
- Q.8** a. What is McClelland's trio of needs? (8)  
b. State and explain the characteristics of effective control system (8)
- Q.9** a. What are the techniques that may be used to improve motivation? (8)  
b. Distinguish between engineering management and management in general (8)