

Reg. No. \_\_\_\_\_ Name \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**THIRD TRIMESTER MBA DEGREE EXAMINATION JAN 2019**

**36 OPERATIONS RESEARCH**

Max. Marks: 60

Duration: 3 Hours

*Any missing data shall be assumed. All assumptions must be clearly stated.*

*Use of statistical tables and graph sheets are permitted, if necessary.*

**Part A**

*Answer all questions. Each question carries 2 marks*

1. List the major techniques used in Operations Research.
2. State an 'Unbalanced Assignment Problems', using an example.
3. How will you find whether a Simplex problem is degenerate?
4. Describe the different decision making environments.
5. List down the steps in PERT.

(5x2 marks = 10 marks)

**Part B**

*Answer any 3 questions. Each question carries 10 marks*

6. Solve the given LPP using Graphical method:

$$\begin{aligned} &\text{Maximize,} && Z = 8x_1 + 6x_2 \\ &\text{Subject to:} && 2x_1 + x_2 \leq 1000 \\ &&& x_1 + x_2 \leq 800 \\ &&& x_1 \leq 400 \\ &&& x_2 \leq 700 \text{ and} \\ &&& x_1, x_2 \geq 0 \end{aligned}$$

7. Determine the Initial Basic Feasible Solution to the following Transportation Problem using i) North West Corner Rule and ii) Least Cost Method

	<i>Distribution Centres</i>				
Sources	D1	D2	D3	D4	<i>Supply</i>
S1	2	3	11	7	6
S2	1	0	6	1	1
S3	5	8	15	9	10
<i>Requirements</i>	7	5	3	2	

8. a) Differentiate a Transportation Problem and an Assignment Problem. (4)
- b) Explain, using an example, the duality Theorem : "the dual of the dual is primal" (6)
9. A contractor has a choice between two courses of action, namely:
  - a) A risky contract promising Rs. 10 lakhs with a probability of 0.6 and Rs. 6 lakhs with a probability of 0.4.
  - b) A diversified portfolio consisting of two contracts with independent outcomes each paying 5 lakhs with a chance of 0.6 and Rs. 3 lakhs with a chance of remaining.

- i) Construct the Decision Tree for using EMV Criteria.  
 ii) What is the optimal decision the contractor should take?
10. a) Discuss *Savage Criterion* and *Hurwicz Criterion* (4)  
 b) Write short notes on:  
 i. *PERT procedure*  
 ii. *Resource Levelling* (6)
- (3x10 marks = 30 marks)

**Part C**

***Compulsory question, the question carries 20 marks***

11. a) A self service store employs one cashier at its counter. An average of 9 customers arrives every 5 minutes, while the cashier can serve 10 customers in 5 minutes. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, calculate :
- i. Utilization rate  
 ii. Average no. of customers in the system  
 iii. Average no. of customers in the queue  
 iv. Average time a customer spends in the system , and  
 v. Average time a customer waits before being served. (10)
- b) i. Describe :*Saddle Point* and *Principle of Dominance*  
 ii. Solve the game whose pay-off matrix is :

		<i>Player Q</i>		
		I	II	III
<i>Player P</i>	I	-3	-2	6
	II	3	0	2
	III	5	-2	-4

(10)

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