

M TECH  
(SEM I) THEORY EXAMINATION 2018-19  
APPLIED OPERATION RESEARCH

Time: 3 Hours

Total Marks: 100

Note: Attempt all Questions. If require any missing data; then choose suitably.

- Q1. Answer any two parts: 10 X 2 =20
- Discuss the significance and scope of OR in modern management.
  - Explain the meaning of linear programming problem stating its uses and give its limitations.
  - Solve the following LPP by simplex method:  
 Maximize  $Z = 3x_1 - x_2$   
 Subject to  $2x_1 + x_2 \geq 2$ ;  
 $x_1 + 3x_2 \leq 3$ ;  
 $x_2 \leq 4$ .
- Q2. Answer any two parts: 10 X 2 =20
- What is parametric programming? Write the algorithm to solve the LPP by parametric programming.
  - State and prove Bayes Theorem and solve the following problem A and B throw an alternately with a pair of dice.
  - Explain the Primal dual relationships. How can dual problem be useful in management decision making? And find the dual of the following Primal:  
 Max  $z = 3x_1 - 2x_2$   
 Subject to:  $x_1 + x_2 \leq 5$ ;  
 $-x_2 \leq -1$ ;  
 $0 \leq x_1 \leq 4$   $0 \leq x_2 \leq 6$ ;  
 and  $x_1, x_2 \geq 0$ .
- Q3. Answer any two parts: 10 X 2 =20
- What is degeneracy in transportation problem? How is it resolved?
  - Define the following terms with examples.
    - Pay off
    - Optimal strategy
    - Value of game
    - Saddle point
    - Rule of Dominance.
  - Show that the assignment model is a special case of the transportation model.
- Q4. Answer any two parts: 10 X 2 =20
- Four counters are being run on the frontier of a company to check the passport and necessary papers of the tourists. The tourists chose counter at random. If the arrival at the frontier is poisson at the rate  $\lambda$  and service time is exponential with parameter  $\lambda/2$ , what is the steady state average at each counter?
  - Explain M/M/1 ( $\infty$ /FCFS) system and solve it under steady state condition.
  - In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average 36 minutes. Calculate the following:
    - Average number of trains in the system.
    - The Probability that the queue exceeds 10.

Q5. Answer any two parts:

10 X 2 =20

- a) Explain ABC analysis with examples.
- b) An investment consultant predicts that the odds against the price of a certain stock will go up during the next week are 2:1 and the odd in favour of the price remaining the same are 1:3. What is the probability that the price of the stock will go down the next week?
- c) Describe the following in brief:
  - (i) Traffic intensity
  - (ii) Service channel
  - (iii) Steady and transient state
  - (iv) Utilization factor

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