**Printed Pages: 04** **Sub Code: RMB207**

**Paper Id:** 270237 **Roll No.** | | | | | | | | | | |

**M.B.A.**
**(SEM II) THEORY EXAMINATION 2017-18**
**QUANTITATIVE TECHNIQUES FOR MANAGERS**

***Time: 3 Hours*** ***Total Marks: 70***

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

## Section A

**Q1. Answer the following questions:** **( 7x2=14 marks)**

a) What are decision trees?
b) What is the significanee of utility as a basis of deeision-making?
c) Give managerial uses of game theory.
d) What is feasible region in graphieal method of solving LPP?
e) What is a sequeneing problem?
f) Write short notes on M/M/1 queuing model.
g) What is the role of crashing in network analysis?

## Section B

**Q2. Answer any 3 of the following:** **(3 x 7= 21 marks)**

a) Briefly explain the different decision rules usually adopted in the eontext of decision making under conditions of uncertainty.

b) Solve the following problem by using Two-Phase method

Minimize $Z = x_1 + x_2$
subject to $2x_1 + x_2 \geq 4$,
$x_1 + 7x_2 \geq 7$,
& $x_1, x_2 \geq 0$

c) Reduce the following two persons zero-sum game to 2x2 orders and obtain the optimal strategies for each player and the value of the game.

| | | Player B | | | |
|---|---|---|---|---|---|
| | | B1 | B2 | B3 | B4 |
| | A1 | 3 | 2 | 4 | 0 |
| Player A | A2 | 3 | 4 | 2 | 4 |
| | A3 | 4 | 2 | 4 | 0 |
| | A4 | 0 | 4 | 0 | 8 |

d) Explain the concept of PERT and CPM. Explain the key differences between PERT and CPM.

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e) A self – service store employs one cashier at its counter. Nine customers arrive on an average of every 5 mins, while the cashier can serve 10 customers in 5 mins. Assuming Poisson distribution for arrival rate and exponential distribution for service rate, find

(a) Average number of customers in the system.

(b) Average number of customers in queue or average queue length.

(c) Average time a customer spends in the system

(d) Average time a customer waits before being served

## Section C

**Q3. Attempt any one of the followings:** **(7 marks)**

a). Suppose a grocer is faced with a problem of how many cases of milk to stock to meet tomorrow's demand. All the eases of milk left at the end of the day are worthless. Each case of milk is sold for ` 8/- and it is purehased for ` 5/-. Hence each case sold brings a profit of ` 3/- but if it is not sold at the end of the day it must be resulting in a loss of ` 5/-. The historical reeord of the no. of eases of milk demanded is as follows: -

| No. of cases of milk demanded | Probability of each event |
|---|---|
| 13 | .05 |
| 14 | .10 |
| 15 | .20 |
| 16 | .30 |
| 17 | .25 |
| 18 | .10 |
| **TOTAL** | **1.00** |

What should be the optimal solution for decision of the grocer concerning the no. of cases of milk to stock.

b) Operations Research is a very powerful tool and analytieal process that offers the presentation of an optimum solution in spite of its limitations. Discuss.

**Q4. Attempt any one of the followings:** **(1x7 =7 marks)**

a) Determine an initial basic feasible solution to the following transportation problem using Vogel's Approximation Method.

| | Destination 1 | Destination 2 | Destination 3 | Destination 4 | Supply |
|---|---|---|---|---|---|
| Source 1 | 21 | 16 | 15 | 3 | 11 |
| Source 2 | 17 | 18 | 14 | 23 | 13 |
| Source 3 | 32 | 27 | 18 | 41 | 19 |
| Demand | 6 | 10 | 12 | 15 | |

b) A paper mill produces two grades of paper namely X and Y. Owing to raw material restrietions, it cannot produce more than 400 tons of grade X and 300 tons of grade Y in a week. There are 160 production hours in a week. It requires 0.2 and 0.4 hours to produce a ton of products X and Y

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respectively with corresponding profits of Rs. 200 and Rs. 500 per ton. Formulate the above as a LPP to maximize profit.

**Q5. Attempt any one of the following: (1x7=7 marks)**

a) Consider an example where four jobs (J1, J2, J3, and J4) need to be executed by four workers (W1, W2, W3, and W4), one job per worker. The matrix below shows the cost of assigning a certain worker to a certain job. The objective is to minimize the total cost of the assignment.

| | J1 | J2 | J3 | J4 |
|---|---|---|---|---|
| W1 | 82 | 83 | 69 | 92 |
| W2 | 77 | 37 | 49 | 92 |
| W3 | 11 | 69 | 5 | 86 |
| W4 | 8 | 9 | 98 | 23 |

b) Firms X and Y are competing for a business. Whatever X gain Y losses. The matrix shows the utility to firm X for various market share.

**F1RM X's UTIL1TY**

| X/Y | No Advertising | Medium Advertising | Large Advertising |
|---|---|---|---|
| No Advertising | 60 | 50 | 40 |
| Medium Advertising | 70 | 70 | 50 |
| Large Advertising | 80 | 60 | 75 |

Find the optimal strategies for firm X and Y and also the value of the game.

**Q6. Attempt any one of the following: (1x7=7 marks)**

a) There are five jobs, each of which must go through the machines A, B and C in the order ABC. Proeessing times are:

| Jobs | A | B | C |
|---|---|---|---|
| 1 | 4 | 5 | 8 |
| 2 | 9 | 6 | 10 |
| 3 | 8 | 2 | 6 |
| 4 | 6 | 3 | 7 |
| 5 | 5 | 4 | 11 |

Determine a sequence for the five jobs that will minimize the elapsed time T.

b) Two jobs, A and B, are to be processed on 6 machines. The sequenee of machines and the processing times are given in the following table.

Job A Machine sequenee M1 M2 M3 M4 M5 M6

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| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Time (Hours) | 6 | 4 | 5 | 3 | 4 | 2 |
| Job B | Machine sequence | M1 | M2 | M3 | M4 | M5 | M6 |
| | Time (Hours) | 4 | 8 | 4 | 3 | 6 | 4 |

What is the minimum time in which both the jobs can be completed?

**Q7. Attempt any one of the following: (1x7=7 marks)**

a) For a small project of 12 activities, the details are given below, Draw a network and compute the earliest occurrence time, Latest occurrence time, critical activities and project completion times:

| Activity | A | B | C | D | E | F | G | H | I | J | K | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Dependence | - | - | - | B,C | A | C | E | E | D,F,H | E | I,J | G |
| Duration(days) | 9 | 4 | 7 | 8 | 7 | 5 | 10 | 8 | 6 | 9 | 10 | 2 |

b) The owner of chain of fast food restaurants is considering a new computer system for accounting and inventory control. A computer company sent the following information about the system installation

| Activity Identification | Immediate predecessor | Time | | |
|---|---|---|---|---|
| | | Most Optimistic | Most likely | Most pessimistic |
| A | - | 4 | 6 | 8 |
| B | A | 5 | 7 | 15 |
| C | A | 4 | 8 | 12 |
| D | B | 15 | 20 | 25 |
| E | B | 10 | 18 | 26 |
| F | C | 8 | 9 | 16 |
| G | E | 4 | 8 | 12 |
| H | D, F | 1 | 2 | 3 |
| I | G,H | 6 | 7 | 8 |

I. Construct arrow diagram (b) Find Critieal Path and expected project completion time

II. Find Probability of completing project in 55 days.

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