



II Semester M.B.A. Degree Examination, July 2017
(CBCS Scheme)
MANAGEMENT

2.6 : Quantitative Techniques and Operation Research

Time : 3 Hours

Max. Marks : 70

*Instructions : Answer all the Sections.
Calculators and normal distribution tables are allowed.*

SECTION – A

Answer any five of the following questions, each question carries five marks. (5×5=25)

1. Explain the role of queuing theory in decision-making and discuss its application.
2. Write a detailed note on role of operations research models in decision making.
3. Solve the following game theory using dominance principle.

| | | Firm B | | | |
|--------|----------------|----------------|----------------|----------------|----------------|
| | | B ₁ | B ₂ | B ₃ | B ₄ |
| Firm A | A ₁ | 35 | 65 | 25 | 05 |
| | A ₂ | 30 | 20 | 15 | 00 |
| | A ₃ | 40 | 50 | 00 | 10 |
| | A ₄ | 55 | 60 | 10 | 15 |

4. The captain of a cricket team has to allot five middle batting positions to five batsmen. The average runs scored by each batsman at these positions are as follows :

| | | Batting positions | | | | |
|---------|---|-------------------|----|-----|----|----|
| | | I | II | III | IV | V |
| Batsmen | P | 40 | 40 | 35 | 25 | 50 |
| | Q | 42 | 30 | 16 | 25 | 27 |
| | R | 50 | 48 | 40 | 60 | 50 |
| | S | 20 | 19 | 20 | 18 | 25 |
| | T | 58 | 60 | 59 | 55 | 53 |

Find the assignment of batsman to positions which would give the maximum number of runs.

P.T.O.



5. The Crux Honda Ltd. manufactures around 150 scooters. The daily production varies from 146 to 154 depending upon the availability of raw materials and other working conditions.

| Production per day | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 |
|--------------------|------|------|------|------|------|------|------|------|------|
| Probability | 0.04 | 0.09 | 0.12 | 0.14 | 0.11 | 0.10 | 0.20 | 0.12 | 0.08 |

The finished scooters are transported in a specially arranged lorry accommodating 150 scooters, using the following random numbers :

80, 81, 76, 75, 64, 43, 18, 26, 10, 12, 65, 68, 69, 61, 57. Simulate the process to find out :

- What will be the average number of scooters waiting in the factory ?
 - What will be the average number of empty space on the lorry ?
6. Find the sequence of the following eight jobs, that will minimize the total elapsed time for the completion of all the jobs. Each job is processed in the same order CAB. Entries given are time in hours on the machines.

Jobs

| | J ₁ | J ₂ | J ₃ | J ₄ | J ₅ | J ₆ | J ₇ | J ₈ | |
|----------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|---|
| Machines | A | 4 | 6 | 7 | 4 | 5 | 3 | 6 | 2 |
| B | 8 | 10 | 7 | 8 | 11 | 8 | 9 | 13 | |
| C | 5 | 6 | 2 | 3 | 4 | 9 | 15 | 11 | |

7. What is linear programming ? What is its importance in today's business ?

SECTION - B

Answer any three of the following questions, each question carries ten marks. (3×10=30)

8. Discuss the significance and scope of operation research in modern business management.



9. A publisher has rest signed a contract for the publication of a book. What is the earliest time that the book can be ready for distribution ? The tasks in the table are involved, with the estimates given in weeks.

| Activity | A | B | C | D | E | F | G | H | I | J |
|-------------|----|---|------|----|------|---|---|------|------|------|
| Precedence | - | - | A, B | A | C, D | E | E | C, D | F, G | I, H |
| Most likely | 8 | 2 | 2 | 6 | 4 | 3 | 4 | 6 | 8 | 1 |
| Optimistic | 4 | 2 | 1 | 4 | 3 | 3 | 3 | 4 | 6 | 1 |
| Pessimistic | 10 | 2 | 3 | 12 | 5 | 3 | 5 | 9 | 16 | 1 |

- i) Draw a network and find the critical path, what is the expected length of the critical path and what is its variance ?
- ii) What is the probability that the length of the critical path does not exceed
 - a) 32 weeks
 - b) 36 weeks.

10. Solve the given LPP by simplex method.

$$\text{Maximize } Z = 5x_1 + 10x_2 + 8x_3$$

$$\text{Subject to } 3x_1 + 5x_2 + 2x_3 \leq 60$$

$$4x_1 + 4x_2 + 4x_3 \leq 72$$

$$2x_1 + 4x_2 + 5x_3 \leq 100$$

$$x_1, x_2, x_3 \geq 0.$$

11. The following mortality rates have been observed for a certain types of fuses :

| Week | 1 | 2 | 3 | 4 | 5 |
|------------------------------|---|----|----|----|-----|
| % failing by the end of week | 5 | 15 | 35 | 75 | 100 |

There are 1000 fuses in use and it costs Rs. 5 to replace on individual fuse. If all fuse were replaced simultaneously it would cost Rs. 1.25 per fuse. At what intervals the groups replacement should be done ? Which policy is better ?



SECTION - C

12. Case study (compulsory) :

(1×15=15)

Solve the transportation problem to maximise profits and give criterion for optimality.

| | | Destinations | | | | Capacity | | |
|-------------|----------------|----------------|----------------|----------------|----------------|--|-----|-----|
| | | D ₁ | D ₂ | D ₃ | D ₄ | | | |
| Plants | P ₁ | 40 | 25 | 22 | 33 | 100 | | |
| | P ₂ | 44 | 35 | 30 | 30 | 30 | | |
| | P ₃ | 38 | 38 | 28 | 30 | 70 | | |
| Requirement | | 40 | 20 | 60 | 30 | <table border="1"><tr><td>200</td></tr><tr><td>150</td></tr></table> | 200 | 150 |
| 200 | | | | | | | | |
| 150 | | | | | | | | |