



PG – 520

II Semester M.Com. Examination, June 2016  
(CBCS)

COMMERCE

Paper – 2.5 : Operations Research and Quantitative Techniques

Time : 3 Hours

Max. Marks : 70

**Instruction :** Answer to *all* the questions.

SECTION – A

Answer **any seven** questions out of ten. **Each** question carries **two** marks. (7×2=14)

1. a) Define Probability.  
b) What do you mean by random variables ?  
c) Define Risk.  
d) What do you mean by burst event ?  
e) Define critical path.  
f) List out software packages for LPP solutions.  
g) What is decision tree ?  
h) Define likely events.  
i) Define operation research.  
j) State two differences of PERT and CPM.

SECTION – B

Answer **any four** questions out of six. **Each** question carries **five** marks. (4×5=20)

2. Write a short note on risk analysis in capital budgeting.
3. Give the Mathematical representation of Transportation model.
4. Explain the different approaches of calculating the probability of an event.
5. A lot of 10 electronic components are known to include 3 defective parts. If a 4 sample of components is selected at random from the lot.
  - i) What is the probability that this sample does not contain more than one defective ?
  - ii) What is the probability that this sample will include at least one defective ?

P.T.O.



6. Solve the following assignment problem in order to minimise the total cost. The cost matrix below gives the assignment cost when different operators are assigned to various machines.

|          |   | Operators |    |     |    |    |
|----------|---|-----------|----|-----|----|----|
|          |   | I         | II | III | IV | V  |
| Machines | A | 30        | 25 | 33  | 35 | 36 |
|          | B | 23        | 29 | 38  | 23 | 26 |
|          | C | 30        | 27 | 22  | 22 | 22 |
|          | D | 25        | 31 | 29  | 27 | 32 |
|          | E | 27        | 29 | 30  | 24 | 32 |

7. ABC Co. is manufacturing two products X and Y. The production is limited to 80 units of product X and 60 units of product Y due to the limited supply of raw material. Production of each of these products requires 5 units and 6 units of electronic components respectively. The electronic components are supplied by another manufacturer and his process i.e., the labour hour's amount to 160 man-days. The production of 1 unit of product X requires 1 man day of labour and 1 unit of product Y requires 2 man days of labour. Each unit of these products is sold in the market at the profit of Rs. 50 and Rs. 80 respectively.

Determine how many units of each product the company should produce to maximize the profit.

### SECTION – C

Answer **any three** questions out of five. **Each** question carries **twelve** marks. (3×12=36)

8. Explain the simplex procedure to solve the linear programming problem.
9. Describe the different decision Criteria.
10. Consider an item for which  
 Annual demand = 10,000 units  
 Cost per unit = Rs. 5  
 Inventory carrying cost = 30%  
 Standard deviation of demand per week = 10 units  
 Ordering cost per order = Rs. 150  
 Average lead time = 4 weeks  
 Maximum delay in lead time = 3 weeks  
 Probability of delay = 0.30  
 Service level = 95%  
 Determine the buffer stock, reserve stock, safety stock and desirable maximum inventory level for this item.



11. Solve the following LPP using Graphic Method.

$$\text{Maximise } Z = 10x_1 + 5x_2$$

$$\text{Subject to } 4x_1 + 5x_2 \leq 100$$

$$5x_1 + 2x_2 \leq 80$$

$$x_1, x_2 \geq 0$$

12. The following table gives data on normal time and cost and crash time and cost for a project.

| Activity | Normal      |            | Crash       |            |
|----------|-------------|------------|-------------|------------|
|          | Time (days) | Cost (Rs.) | Time (days) | Cost (Rs.) |
| 1-2      | 6           | 600        | 4           | 1,000      |
| 1-3      | 4           | 600        | 2           | 2,000      |
| 2-4      | 5           | 500        | 3           | 1,500      |
| 2-5      | 3           | 450        | 1           | 650        |
| 3-4      | 6           | 900        | 4           | 2,000      |
| 4-6      | 8           | 800        | 4           | 3,000      |
| 5-6      | 4           | 400        | 2           | 1,000      |
| 6-7      | 3           | 450        | 2           | 800        |

The indirect cost per day is Rs. 100.

- Draw the network and identify the critical path.
- What are the normal project duration and associated cost ?
- Crash the relevant activities systematically and determine the optimum project completion time and cost.



PG – 705

**II Semester M.Com. Examination, June 2015**  
**(CBCS)**  
**COMMERCE**  
**Paper – 2.5 : Operations Research and Quantitative Techniques**

Time : 3 Hours

Max. Marks : 70

**Instruction:** Answer to **all** the questions.

**SECTION – A**

1. Answer **any seven** questions out of ten. **Each** question carries **two** marks. **(7×2=14)**
- a) What do you mean by Linear Programming ?
  - b) What is an equally likely event ?
  - c) What is Degeneracy ?
  - d) Define Cycling Error.
  - e) What is Probability ?
  - f) What do you mean by earliest starting time ?
  - g) What is meant by Crashing ?
  - h) What do you mean by Successor activity ?
  - i) What do you mean by Buffer inventories ?
  - j) What is Simulation ?

**SECTION – B**

Answer **any four** questions out of six. **Each** question carries **five** marks. **(4×5=20)**

- 2. What are inventory models ? Enumerate the various types of inventory models.
- 3. Explain Branch and Bound technique for feasible solution.
- 4. Give the mathematical representation of the assignment model.

P.T.O.



5. A computer centre has brought 3 expert programmers. The centre needs 3 application programmes to be developed. The head of the computer centre, after studying carefully the programmes to be developed, estimates in a computer time (in minutes) required by the experts to the application programmes as follows :

| Programmes |   | A   | B   | C   |
|------------|---|-----|-----|-----|
| Programmer | 1 | 120 | 100 | 80  |
|            | 2 | 80  | 90  | 110 |
|            | 3 | 110 | 140 | 120 |

Assign programmers to the programmes in such a way that the total computer time is least and compare the result with all other possible combinations.

6. A factory requires 1500 units of an item per month, each costing Rs. 27. The cost per order is Rs. 150 and the inventory carrying charges working out to 20 percent of the average inventory. Find the economic order quantity and the number of orders per year. Would you accept a 2 percent discount on a minimum supply quantity of 1200 units ? Compare the total costs in both the cases.
7. A sample of 100 dry battery cells tested to find the length of life produced the following results : Mean = 12 hours, S.D = 3 hours.

Assuming the data to be normally distributed, what percentage of battery cells are expected to have life :

- More than 15 hours
- Less than 6 hours
- Between 10 and 14 hours.

#### SECTION – C

Answer **any three** questions out of five. **Each** question carries **twelve** marks. (3×12=36)

8. Describe the steps involved in the process of decision making.

9. Solve the following LPP using Graphic Method :

$$\text{Minimise } Z = 40x_1 + 24x_2$$

$$\text{Subject to } 20x_1 + 50x_2 \geq 4800$$

$$80x_1 + 50x_2 \geq 7200$$

$$x_1, x_2 \geq 0$$



10. With the help of quantity cost curve explain the significance of EOQ. What are the limitations of using the formula for an EOQ ?
11. The following table gives data on normal time and cost and crash time and cost for a project.

| Activity | Normal      |            | Crash       |            |
|----------|-------------|------------|-------------|------------|
|          | Time (days) | Cost (Rs.) | Time (days) | Cost (Rs.) |
| 1-2      | 6           | 1400       | 4           | 1900       |
| 1-3      | 8           | 2000       | 5           | 2800       |
| 2-3      | 4           | 1100       | 2           | 1500       |
| 2-4      | 3           | 800        | 2           | 1400       |
| 3-4      | Dummy       | -          | -           | -          |
| 3-5      | 6           | 900        | 3           | 1600       |
| 4-6      | 10          | 2500       | 6           | 3500       |
| 5-6      | 3           | 500        | 2           | 800        |

The indirect cost per day is Rs. 300.

- a) Draw the network and identify the critical path.
- b) What are the normal project duration and associated cost ?
- c) Crash the relevant activities systematically and determine the optimum project completion time and cost.
12. Find the minimum transportation cost :

| Source      | D1 | D2 | D3 | D4 | D5 | Available |
|-------------|----|----|----|----|----|-----------|
| S1          | 4  | 7  | 3  | 8  | 2  | 4         |
| S2          | 1  | 4  | 7  | 3  | 8  | 7         |
| S3          | 7  | 2  | 4  | 7  | 7  | 9         |
| S4          | 4  | 7  | 2  | 4  | 7  | 2         |
| Requirement | 8  | 3  | 7  | 2  | 2  | -         |