

Q.P. Code : 60565

Second Semester M.Com. Degree Examination, July 2019

(CBCS – 2014-15 Scheme)

Commerce

**Paper 2.5 – OPERATIONS RESEARCH AND
QUANTITATIVE TECHNIQUES**

Time : 3 Hours]

[Max. Marks : 70

SECTION – A

1. Answer any **SEVEN** questions out of Ten. Each question carries **2** marks :
(7 × 2 = 14)
- (a) Define linear programming.
 - (b) Give the meaning of Risk.
 - (c) State any four uses of Normal distribution.
 - (d) Define Operations Research.
 - (e) What do you mean by decision tree analysis?
 - (f) Define likely events.
 - (g) State the differences between PERT and CPM.
 - (h) What is crashing?
 - (i) State the software packages available for solving LPP.
 - (j) What do you mean by model building?

SECTION – B

Answer any **FOUR** questions out of Six. Each question carries **5** marks :
(4 × 5 = 20)

2. Twelve one rupee coins are distributed at random among 5 beggars A, B, C, D and E. Find the probability that (a) They get 4, 2, 0, 5 and 1 coins respectively
(b) Each beggar gets at least 2 coins.
3. Explain the different approaches of calculating the probability of an event.

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4. Solve the following Assignment Problem in order to minimize 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

5. Explain the different types of risks faced by the entrepreneur regarding capital budgeting.
6. A company makes bicycles. It produces 450 bicycles a month. It buys the tyres for bicycles from a supplier at a cost of Rs. 200 per tyre. The company's inventory carrying cost is estimated to be 15% of cost and the ordering is Rs. 5,000 per order.
- Calculate :
- (a) EOQ
 - (b) Number of orders to be place per year
 - (c) Average annual ordering cost
 - (d) Average annual carrying cost
 - (e) Total cost
7. The average selling price of houses in a city is Rs. 25,00,000 with a standard deviation of Rs. 6,00,000. Assuming the distribution of selling price to be normal find :
- (a) The percentage of houses that sell for more than Rs. 27,50,000
 - (b) The percentage of houses that sell between Rs. 22,50,000 and 30,00,000
 - (c) The percentage of houses that sell for more than Rs. 20,00,000

SECTION - C

Answer any **THREE** questions out of Five. Each question carries **12** marks :

(3 × 12 = 36)

8. Determine the basic feasible solution for the TP, using NWCM, LCM and VAM. Suggest which method should be adopted.

	D ₁	D ₂	D ₃	D ₄	Supply
O ₁	6	4	1	5	14
O ₂	8	9	2	7	16
O ₃	4	3	6	2	5
Demand	6	10	15	4	35

9. The following table gives data given 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	5	600	4	1000
1 - 3	4	600	2	2000
2 - 4	5	500	3	1500
2 - 5	3	450	1	650
3 - 4	6	900	4	2000
4 - 6	8	800	4	3000
5 - 6	4	400	2	1000
6 - 7	3	450	2	800

The indirect cost per day is Rs. 100.

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

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10. Write short notes on :

- (a) Probability distribution
- (b) Sensitivity Analysis
- (c) Decision tree

11. The following table shows the jobs of a network along with their time estimates :

Activity	Optimistic Time	Most Likely Time	Pessimistic Time
1-2	1	1	7
1-3	1	4	7
2-4	2	2	8
2-5	1	1	1
3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

You are required to

- (a) Draw the network for the project.
 - (b) Calculate Variance and Standard Deviation of Project Length.
 - (c) What is the probability that the project will be completed within 19 weeks?
12. Explain the meaning of "Simulation" and state its usefulness in business decision making.
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PG – 503

II Semester M.Com. Degree Examination, June/July 2018

(CBCS)

COMMERCE

Paper – 2.5 : Operation Research and Quantitative Techniques

Time : 3 Hours

Max. Marks : 70

Instruction : Answer all the questions.

SECTION – A

1. Answer **any seven** of the following sub-questions in about **3-4 lines each**.
Each sub-questions carries **two** marks. (7×2=14)

- What is the term 'Linear Programming' ?
- What is Bernoulli distribution ?
- State the error in Logical Sequencing.
- Write the dual of the following problem

$$\text{Maximize } Z = 2x_1 + 3x_2$$

$$\text{Subject to the constraints } x_1 \leq 4$$

$$x_2 \geq 1$$

$$x_1 + 2x_2 \geq 2$$

$$\text{with } x_1, x_2 \geq 0.$$

- What is Burst Event ?
- What is meant by Pseudo-Random Numbers ?
- State the nature of Laplace Decision Criterion.
- Define Crash time and Crash cost.
- Name the distribution followed by activity time in PERT Model.
- What is the probability of at least one "H" in four tosses of a coin ?

P.T.O.



SECTION – B

Answer **four** of the following in about **one** page. **Each** questions carries **5** marks :

(4×5=20)

2. A medical scientists claims to have found a cure for the common cold that consists of three drugs called K, S and H. His results indicate that the minimum daily adult dosage for effective treatment is 10 mg. of drug K, 6mg. of drug S, and 8 mg. of drug H. Two substances are readily available for preparing pills and drugs. Each unit of substance A contains 6 mg, 1 mg, and 2mg, of drugs K, S and H respectively and each unit of substance B contains 2 mg, 3mg and 2 mg, of the same drugs. Substance A costs Rs. 3 per unit and substance B costs Rs. 5 per unit.
3. Solve the following Assignment problems for minimum solution :

	M_1	M_2	M_3	M_4	M_5
W_1	9	5	6	7	8
W_2	8	5	7	7	8
W_3	6	8	5	6	9
W_4	8	10	7	6	5
W_5	4	6	5	6	4

4. A company has demand rate of 25 items per day and the supply rate is 40 items per day. Ordering cost per order is Rs. 60 and carrying cost is Rs. 73 in one year. Find the EOQ and the total additional cost. It is given that an item costs Rs. 20.
5. An insurance company has these data :
- The probability of an insurance claim in a period of one year is 4 percent for persons under age 30, 2 percent for persons over age 30 and it is known that 30 percent of the targeted population is under age 30. What is the probability of an insurance claim in a period of one year for a randomly chosen person from the targeted population ?
6. Explain the applications of simulation to the problem of financial planning and management.
7. Write a note on Risk analysis in capital budgeting.



SECTION – C

Answer **any three** questions out of five. **Each** question carries **twelve** marks :

(3x12=36)

8. Solve graphically the following Linear Programming Problem :

$$\text{Maximize } 50x_1 + 60x_2$$

Subject to

$$2x_1 + x_2 \leq 300$$

$$3x_1 + 4x_2 \leq 480$$

$$4x_1 + 7x_2 \leq 812$$

$$x_1 + x_2 \geq 0.$$

9. From the given activity table and three types of estimates. Find

- 1) Draw the network diagram
- 2) The critical path
- 3) Standard deviation of the critical path
- 4) Find the probability of completion of the project in due time.
- 5) What is the probability of completing the proper earlier by 10% of the time ?
- 6) What is the probability of completing the project by allowing 15% more time ?

Activity	t_o	t_n	t_p
1 – 2	2	6	10
1 – 3	2	3	4
2 – 3	7	11	15
2 – 4	6	14	16
3 – 4	6	7	14
3 – 5	6	7	14
4 – 5	2	6	10



10. Solve the transportation problem using matrix minima method :

	P	Q	R	S	Availability
A	23	27	16	18	30
B	12	17	20	51	40
C	22	28	12	32	53
Demand	22	35	25	41	

11. What is Decision Tree ? Explain the steps Involved in drawing a decision tree.
12. Explain EOQ model. What are its assumptions ? What are the practical limitations in using this formula ?

	J	K	L	Availability
M	0	4	5-4	
N	2	8	7-8	
O	14	3	8-14	
P	7	1	8-7	
Q	7	1	8-7	
R	4	2	2-4	



PG – 533

II Semester M.Com. Degree Examination, July 2017

(CBCS)

COMMERCE

Paper – 2.5 : Operation Research and Quantitative Techniques

Time : 3 Hours

Max. Marks : 70

SECTION – A

1. Answer **any seven** of the following sub-questions in about **3-4 lines each**.
Each sub-question carries **two** marks : (7×2=14)
- Define linear programming.
 - What is non-degenerate Basic Feasible Solution ?
 - What do you mean by model with one price break ?
 - What do you mean by probability ?
 - Define the term capital budgeting.
 - What do you mean by Independent Float ?
 - Define Operational Research.
 - What do you mean by decision tree analysis ?
 - State the uses of EOQ.
 - What is EMV under Decision Theory ?

SECTION – B

Answer **four** of the following in about **one page**. **Each** question carries **5** marks : (4×5=20)

- “PERT provides the framework with which a project can be described, scheduled and the controlled” – Discuss.
- 12 ‘one rupee’ coins are distributed at random among 5 beggars A, B, C, D and E. Find the probability that :
 - They get 4, 2, 0, 5 and 1 coins respectively
 - Each beggar gets at least two coins and
 - None of them goes empty handed.

P.T.O.



4. Explain the different types of risks faced by the entrepreneur regarding capital budgeting.
5. In a plant layout, four different machines M1, M2, M3 and M4 are to be erected in a machine shop. There are five vacant areas A, B, C, D and E. Because of limited space, Machine M2 cannot be erected at area C and Machine M4 cannot be erected at area A. The cost of erection of machines is given below :

		Area				
		A	B	C	D	E
Machines	M1	4	5	9	4	5
	M2	6	4	-	0	3
	M3	4	5	8	5	1
	M4	-	2	6	1	2

6. Explain what is meant by probability distribution of a random variable ? How is it useful in decision making ?
7. Geetha Perfume Company produces both perfumes and body spray from two flower extracts F1 and F2. The following data is provided :

Liters of Extract			
	Perfume	Body Spray	Daily Availability (ltrs)
Flower Extract, F1	8	4	20
Flower Extract, F2	2	3	8
Profit per litre (Rs.)	7	5	

The maximum daily demand of body spray is 20 bottles of 100 ml each. A market survey indicates that the daily demand of body spray cannot exceed that of perfume by more than 2 litres. The company wants to find out the optimal mix of perfume and body spray that maximizes the total daily profit. Formulate the problem as a linear programming model.



SECTION – C

Answer **any three** of the following. **Each** question carries **12** marks : **(3x12=36)**

8. What is decision making under uncertainty ? Describe the methods which are useful for decision-making under uncertainty.

9. Solve the following LPP by graphical method :

$$\begin{aligned} \text{Minimize } Z &= 18x_1 + 12x_2 \\ \text{Subject to constraints, } & 2x_1 + 4x_2 \leq 60 \\ & 3x_1 + x_2 \geq 30 \\ & 8x_1 + 4x_2 \geq 120 \\ & \text{Where } x_1, x_2 \geq 0. \end{aligned}$$

10. Draw the network for the following project given in Table below :

Activity	Preceded by Initial activity	Duration (weeks)
A	-	10
B	A	9
C	A	7
D	B	6
E	B	12
F	C	6
G	C	8
H	F	8
I	D	4
J	g, h	11
K	E	5
L	I	7

Number the events by Fulkerson's rule and find the critical path. Also find the time for completing the project.



11. What is Monte Carlo simulation ? Explain how simulation is useful in solving queuing and inventory problems.
12. Determine an initial basic feasible solution for the following TP, using the least cost method.

	D₁	D₂	D₃	D₄	Supply
O₁	6	4	1	5	14
O₂	8	9	2	7	16
O₃	4	3	6	2	5
Demand	6	10	15	4	35

Activity	Duration (weeks)	Preceded by
A	10	
B	8	A
C	12	A
D	6	B
E	15	B
F	10	C
G	12	C
H	8	D
I	10	E
J	10	F
K	10	G
L	10	H
M	10	I
N	10	J
O	10	K
P	10	L
Q	10	M
R	10	N
S	10	O
T	10	P
U	10	Q
V	10	R
W	10	S
X	10	T
Y	10	U
Z	10	V



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.

$$\begin{aligned} \text{Maximise } Z &= 10x_1 + 5x_2 \\ \text{Subject to } 4x_1 + 5x_2 &\leq 100 \\ 5x_1 + 2x_2 &\leq 80 \\ x_1, x_2 &\geq 0 \end{aligned}$$

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.

- 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.