

ST. JOSEPH'S EVENING COLLEGE (AUTONOMOUS)
II SEMESTER M.COM EXAMINATIONS APRIL 2018

OPERATIONS RESEARCH & QUANTITATIVE TECHNIQUES

Duration: 2.5 Hours

Max. Marks: 70

SECTION - A

I) Answer any EIGHT of the following questions. (8x2=16)

1. How do activities differ from events?
2. What is forward and backward pass?
3. What is the use of decision tree?
4. What is the significance of EOQ in production management?
5. What do you mean by parallel activities?
6. Define PERT.
7. Mention two characteristics of normal distribution.
8. Define sample space.
9. In a single throw of a dice, what is the probability of getting an even number?
10. Mention any two software used for solving ORQT problems.
11. What is degeneracy?
12. What is the use of sensitivity analysis?

SECTION - B

II) Answer any THREE of the following questions. (3x8=24)

13. VRL Logistics has three vehicles in three cities. Each of the vehicles can be assigned to any of the four other cities. The distance differs from one city to another as under

	W	X	Y	Z
A	33	40	43	32
B	45	28	31	23
C	42	29	36	29

- You are required to assign a vehicle to a city in such a way that the total distance travelled is minimized
14. The petrol price in Karnataka is normally distributed. Price of The average price of petrol per litre within Karnataka was found to be Rs 74 and the standard deviation of Rs. 1.50 per litre .
- a) What percent of petrol pumps can we expect to have a rate of Rs.75 and above per litre?
 - b) What proportion of petrol pumps will be having a rate between Rs.73 to 75 per litre?
15. Q Solve graphically the following Linear programming problem
 Maximize $50X_1 + 60X_2$

Subject to
 $2X_1 + X_2 \leq 300$
 $3X_1 + 4X_2 \leq 480$
 $4X_1 + 7X_2 \leq 812$
 $X_1, X_2 \geq 0$

16. A company makes bicycles. It produces 450 bicycles a month. It buys the tires for bicycles from a supplier at a cost of \$20 per tire. The company's inventory carrying cost is estimated to be 15% of cost and the ordering is \$50 per order.
- Calculate the EOQ
 - What will be the total annual carrying cost and ordering cost?
17. A company is contemplating whether to produce a new product. If it decides to produce the product, it must either install a new division which needs a outlay of four lakh rupees , or work overtime with overtime expenses of Rs. 1.5 lakhs. If the company decides to install a new division, it needs the approval of Government, and the company feels that there is 70% chance of getting the approval. A market survey revealed the following facts regarding the magnitude of sales for the new product.

Magnitude of states	Probability	Results profit (in Rs. Lakhs)
High	0.45	15
Medium	0.30	7
Low	0.20	3
Nil	0.05	- 5 (loss)

However by resorting to the overtime, the company will not be in a position to meet the high magnitude of sales. It will be able to satisfy up to the level of medium magnitude only, even if high magnitude of sales result. Solve the problem to suggest: Which option should be selected?

SECTION - C

III) Answer any ONE of the following questions. (1x15=15)

18. A project has the following activities and characteristics

Activity i - j	Estimated duration in weeks		
	Optimistic	Most likely	Pessimistic
1 - 2	1	1	7
1 - 3	1	4	7
1 - 4	2	2	8
2 - 5	1	1	1
3 - 5	2	5	14
4 - 6	2	5	8
5 - 6	3	6	15

- a) Find the expected time and variance
 b) Draw the project network
 c) Find expected project length and activities on the critical path
 d) If the project due date is 18 weeks, what is the probability of meeting and not meeting the due date at 90% level?
19. Use simplex method to solve the following Linear programming problem
 Max $Z = 6X_1 + 8X_2$
 Subject to constraints
 $2X_1 + 3X_2 \leq 16$
 $4X_1 + 2X_2 \leq 16$

20. A company manufactures around 200 scooters. Depending upon the availability of raw materials and other conditions, the daily production has been varying from 196 scooter to 204 scooters whose probability distribution is as given below

Production/day	196	197	198	199	200	201	202	203	204
Probability	0.05	0.09	0.12	0.14	0.20	0.15	0.11	0.08	0.06

The finished scooters are transported in a specially designed three level storage lorry that can accommodate only 200 scooters.

Using the following 15 random numbers 82 , 89 , 78 , 24 , 53 , 61 , 18 , 45 , 04 , 23 , 50 , 77 , 27 , 54 , 10 simulate the process to find out

- i) What will the average number of mopeds waiting in the factory?
 ii) What will be the average number of empty space in the Lorry

SECTION - D

IV) Analyze the case and answer the question. (1x15=15)

21. A product is produced by four factories A, B, C and D. Their unit production costs are Rs.2, Rs.3, Rs.1 and Rs.5 respectively. The production capacities in each factory are 50 units, 70 units, 30 units and 50 units respectively. These factories supply the units to four stores P, Q, R and S. The demands of which are 25, 35, 105 and 20 units, respectively. Unit transportation cost in rupees from each factory to each store is given in the table below.

Stores → Factories	P	Q	R	S
A	2	4	6	11
B	10	8	7	5
C	13	3	9	12
D	4	6	8	3

Determine the extent of deliveries from each of the factories to each of the stores so that the total transportation is minimum.