# ST. JOSEPH'S EVENING COLLEGE (AUTONOMOUS) 

 II SEMESTER M.COM EXAMINATIONS - APRIL 2019
## OPERATIONS RESEARCH AND QUANTITATIVE TECHNIQUES

## Duration: 2.5 Hours

Max. Marks: 70

## SECTION - A

I) Answer any EIGHT of the following questions.
( $8 \times 2=16$ )

1. What do you mean by Linear programming?
2. Give the meaning of an event.
3. What do you mean by crashing?
4. What do you understand by holding cost?
5. What are the objectives of inventory management?
6. What do you mean by expected opportunity loss?
7. Give the meaning of random variable.
8. Write any two uses of assignment problem.
9. Write any two uses of Simulation.
10. Give the importance of risk analysis in capital budgeting.

## SECTION - B

## II) Answer any THREE of the following questions.

11. A bag contains 20 tickets marked with numbers 1 to 20 . One ticket is drawn at random. Find the probability, that it will be a multiple of i)2 or 5, ii) 3 or 5
12. A company uses $1,00,000$ units of a particular item per year. Each item costs Rs. 2 per unit. The production engineering department estimates setup cost at Rs. 25 and the accounting department estimates the holding cost as $12.5 \%$ of the value of the inventory per year. Replenishment Rate is uniform 500 units per day. Assuming 250 working days (per replenishment purpose) calculate:
a) Optimal setup quantity.
b) Total inventory cost on the basis of optimal policy, and
c) Optimal number of setups.
13. A company produces two types of pens, A \& B. Pen A is of superior quality and pen B is of inferior quality. Profit on pen A and B are Rs. 5 and Rs. 3 per pen respectively. Raw materials required for each pen A is twice as that of pen B . The supply of raw material is sufficient only for 1000 pens per day. Pen A required a special clip and only 400 clips are available per day. Of pen B only 700 clips are available per day. Formulate the above as Linear Programming module.
14. Solve the following Assignment Problem.

| Machine | Operators |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | $\mathbf{1}$ | $\mathbf{2}$ | $\mathbf{3}$ | $\mathbf{4}$ |
|  | 60 | 50 | 40 | 45 |
| $\mathbf{B}$ | 40 | 45 | 55 | 35 |
| $\mathbf{C}$ | 55 | 70 | 60 | 50 |
| $\mathbf{D}$ | 45 | 45 | 40 | 45 |

15. An investor is given the following investment alternatives and percentage rates of return.

|  | States of nature (Market Conditions) |  |  |
| :--- | :---: | :---: | :---: |
|  | Low | Medium | High |
| Regular shares | $7 \%$ | $10 \%$ | $15 \%$ |
| Risky shares | $-10 \%$ | $12 \%$ | $25 \%$ |
| Property | $-12 \%$ | $18 \%$ | $30 \%$ |

Over the past 300 days, 150 days have been medium market conditions and 60 had high market conditions. On the basis of these data, state the optimum investment strategy for the investment.

## SECTION - C

III) Answer any ONE of the following questions.
16. Find the basic feasible solution for the TP, using NWCM and LCM.

|  | DESTINATION |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: |
| FACTORY | $\mathbf{D}_{\mathbf{1}}$ | $\mathbf{D}_{\mathbf{2}}$ | $\mathbf{D}_{\mathbf{3}}$ | $\mathbf{D}_{\mathbf{4}}$ | SUPPLY |
| $\mathbf{F}_{\mathbf{1}}$ | 3 | 3 | 4 | 1 | 100 |
| $\mathbf{F}_{\mathbf{2}}$ | 4 | 2 | 4 | 2 | 125 |
| $\mathbf{F}_{\mathbf{3}}$ | 1 | 5 | 3 | 2 | 75 |
| DEMAND | 120 | 80 | 75 | 25 | 300 |

17. Solve graphically the following LPP:

Max. $Z=20 X_{1}+10 X_{2}$
subject to $\mathrm{X}_{1}+2 \mathrm{X}_{2} \leq 40$

$$
\begin{aligned}
& 3 X_{1}+X_{2} \geq 30 \\
& 4 X_{1}+3 X_{2} \geq 60 \\
& X_{1} \& X_{2} \geq 0
\end{aligned}
$$

18. The wholesaler of sports goods has an opportunity to buy 5000 pairs of shoes that have been declared surplus by the government. The wholesaler will pay Rs. 50 per pair and can obtain Rs. 100 by selling pair of shoes to retailers. The prices are well established, but the wholesaler is in doubt as to just how many pairs he will be able to sell. Any pair of shoes left over, he can sell to discount outlets at Rs. 20 a pair. After a careful consideration of the historical data, the wholesaler assigns probabilities to demand as follows:

| Retailer's demand | probability |
| :---: | :--- |
| 1000 pairs | 0.6 |
| 3000 pairs | 0.3 |
| 5000 pairs | 0.1 |

1. Compute conditional monetary and expected monetary value
2. Compute the expected profit with a perfect predicting device
3. Compute EVPI

## SECTION - D

## IV) Analyze the case and answer the questions.

19. The table below provides costs and estimates for a seven -activity project.

| Activity | Time estimates (weeks) |  | Direct cost estimates <br> (Rs 000's) |  |
| :---: | :---: | :---: | :---: | :---: |
|  | Normal | Crash | Normal | Crash |
| $\mathbf{1 - 2}$ | 2 | 1 | 10 | 15 |
| $\mathbf{1 - 3}$ | 8 | 5 | 15 | 21 |
| $\mathbf{2 - 4}$ | 4 | 3 | 20 | 24 |
| $\mathbf{3 - 4}$ | 1 | 1 | 7 | 7 |
| $\mathbf{3 - 5}$ | 2 | 1 | 8 | 15 |
| $\mathbf{4 - 6}$ | 5 | 3 | 10 | 16 |
| $\mathbf{5 - 6}$ | 6 | 2 | 12 | 36 |
|  |  |  |  |  |

Draw the project network and crash the activities so that the project completion time reduces to 9 weeks.

