

K. J. Somaiya Institute of Management Studies and Research

Program: MIM Semester – I (2018-21 Batch)

**Subject: Quantitative Techniques in Management
(EndTerm Examination)**

Maximum marks: 50

Duration: 3hours

Date: 22/11/2018

Notes:

- 1. You have to attempt 5 questions in all.**
 - 2. Make suitable assumptions if required and state them.**
 - 3. Write all relevant answers in your EXCEL sheet, with sufficient detail to enable a fast evaluation of your answers.**
 - 4. Keep saving the file on the desktop every ten minutes or so.**
 - 5. Make only 1 Excel file with different worksheets pertaining to each question.**
 - 6. Name the file with your division and roll number only (no names). Finally, transfer the file to an exam folder, as per on-the-spot instructions given to you.**
1. Find the seasonal indices for following data. And predict sales for year 2015

10 Marks

| Year | Quarters | | | |
|------|----------|----|-----|----|
| | I | II | III | IV |
| 2010 | 38 | 51 | 42 | 42 |
| 2011 | 45 | 60 | 64 | 53 |
| 2012 | 52 | 74 | 75 | 54 |
| 2013 | 70 | 75 | 63 | 67 |
| 2014 | 80 | 92 | 82 | 82 |

2. A catering manager is in the process of replacing the furniture in the canteen. He wishes to determine how many tables of type S (seating 6) and how many of type T (seating 10) to buy. He estimates that each type S table needs 7 meters sq. Of floor space while each type T needs 9. He has to work under the following constraints:
- The canteen must be able to accommodate at least 60000 people.
 - The available floor space of the canteen is at most 63000 sq. Meters. Advice the manager on how many tables of each type to buy if type S Rs. 100 and each type T costs Rs. 190. Do sensitivity analysis and explain in detail Using solver. Please also prepare

graph .

10 Marks

3. Attempt the following:

- a) The manager of an oil refinery must decide on the optimal mix of two possible blending processes of which the inputs & outputs per production run are as follows:

| Process | Input Units | | Output Units | |
|---------|-------------|---------|--------------|------------|
| | Crude A | Crude B | Gasoline X | Gasoline Y |
| 1 | 5 | 3 | 5 | 8 |
| 2 | 4 | 5 | 4 | 4 |

The maximum amounts available of crude A & B are 200 units & 150 units respectively. Market requirement shows that at least 100 units of Gasoline X and 80 units of Gasoline Y must be produced. The profit per production run from process1 & process2 are Rs. 300 and Rs. 400. Formulate this problem as LP.

5 Marks

- b) A solicitor's firm employs typists on a hourly price rate basis for their daily work. There are five typists and their charges & speed are different. According to an early understanding only one job is given to one typist and the typist is paid for a full hour even if he works for a fraction of hour. Find the least cost allocation for the following data.

5 Marks

| Typist | Rates per hour (Rs.) | No. Of pages typed/hr | Job | No. Of pages |
|--------|----------------------|-----------------------|-----|--------------|
| A | 5 | 12 | P | 199 |
| B | 6 | 14 | Q | 175 |
| C | 3 | 8 | R | 145 |
| D | 4 | 10 | S | 298 |
| E | 4 | 11 | T | 178 |

4. Attempt the following:

- a) The income of a group of 10000 persons was found to be normally distributed with mean Rs. 750 p.m. and SD Rs. 50. This group's about 95% has income exceeding Rs. 668 and only 5% has income exceeding Rs. 832. What was the lowest income among the richest 100?

5 Marks

- b) A student majoring in finance is trying to decide upon the number of firms to which he should apply. Given his work experience and academic records, he has been told by a placement coordinator that he can expect to receive a job offer from 80% of the firms to which he applies. Wanting to save time the student applies to 7 firms only. Assuming that coordinators estimate is correct. Find the probability that the student receives: (i) No offer, (ii) at most two offers and (iii) four or more offers

5 Marks

5. Attempt the following:

- a) A small town has 5600 residents. The residents in the town were asked whether or not they favored a new bridge across the river. You are given the following information on the residents' responses, broken down by gender.

| | Men | Women | Total |
|----------|------|-------|-------|
| In Favor | 1400 | 280 | 1680 |
| Opposed | 840 | 3080 | 3920 |
| Total | 2240 | 3360 | 5600 |

Please show whether opinion and gender are independent events.

5 Marks

- b) A water purifier sales person finds that the probability of selling a unit to a prospective buyer is 0.30 but improves to 0.60 on the second contact. The sales person will not contact a prospective buyer more than twice. If the salesman contacts a prospective buyer, determine the probability that the buyer will buy a water purifier?

5 Marks

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