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| **C:\Users\ADMIN\Desktop\j.png** | **JAIPURIA INSTITUE OF MANAGEMENT, INDORE**Post Graduate Diploma in Management (Batch 2022-24) |
| **Course Title: Operations Research, (Course Code: 40521)****End Term (Improvement) Examination, Term - III (July, 2023)**  |
|  **Time Duration : 2 Hours Total Marks: 40** |

*Students can Use MS Excel Solver to answer Questions. Please save only ONE excel File with your name and enrollment number and create multiple sheets for each question separately.*

Q1. Three friends, Radhika, Sakshi and Ravina are working in different multinational companies in Bengaluru and share an apartment. As they have long working hours, finding a domestic help is very difficult for them. So, they have to manage domestic work along with their busy corporate schedules. In addition to the daily tasks like cooking etc. there are some weekly tasks. The weekly tasks and timings (Minutes) for each are tabulated below. Each member is required to complete TWO tasks only per week.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Tasks | Weekly Laundry | Dusting & Cleaning | Grocery Purchasing | Minor Repairs | Vehicles Washing | Managing petty home affairs |
| Radhika  | 90 | 50 | 60 | 65 | 35 | 30 |
| Sakshi  | 80 | 55 | 50 | 45 | 40 | 35 |
| Ravina | 85 | 40 | 70 | 50 | 40 | 25 |

Analyze the situation and suggest best allocation of tasks.  **(8 marks)**

Q2. Pepsi and coke are fighting for market share in a small town of Finland. Both the multinational companies can opt for a combination of strategies among Heavy Advertising, Medium Advertising and Low Advertising. The forecasted market share is tabulated below.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 |
| Promotion Strategy by Pepsi  | Heavy Advt. | Medium Advt. | Low Advt. | Heavy Advt. | Medium Advt. | Low Advt. | Heavy Advt. | Medium Advt. | Low Advt. |
| Promotion Strategy by Coke  | Heavy Advt. | Heavy Advt. | Heavy Advt. | Medium Advt. | Medium Advt. | Medium Advt. | Low Advt. | Low Advt. | Low Advt. |
| Market share of Pepsi (%) | 43 | 38 | 30 | 52 | 40 | 36 | 56 | 47 | 38 |

Analyze situation and suggest a suitable promotion plan to Pepsi.  **(8 marks)**

Q3. “Goa Bikers” is a startup which recently started operations in Goa. The company rents Motor Cycles to tourists on a daily basis. The daily rent of Hero Honda Motor cycle is Rs. 1800/-. The customer has to fill petrol in the bike. All other maintenance etc. is carried out by the company. The running cost is Rs. 500/- per bike per day. Company operates for 7 days each week for 50 weeks in a year, and is closed for two weeks every year during heavy rain season. Recently, “Goa Bikers” received an offer from one of the Hero-Honda Retail showroom. The Retailer offered “Goa Bikers” their bestselling motor cycle “Hero Honda Splender” at Rs. 74,000/- each with a buy back agreement after one year at 40 % of the sale price. The daily demand probability (bike requirement) is presented below.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Bikes Rented each day | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 |
| Probability | 0.06 | 0.10 | 0.13 | 0.19 | 0.21 | 0.14 | 0.10 | 0.05 | 0.02 |

Analyze the situation and suggest best course of action to “Goa Bikers”  **(8 marks)**

Q4. Supreme Steels Limited manufactures AISI 304 and AISI 321 grade stainless steels. This grade requires Nickel between 8 – 9 % and Chromium between 18 – 20 %. The remaining metal is Iron. Company makes this AISI 304 and AISI 321 grades of stainless steel by melting scrap of various stainless steel grades like AISI 310 (Nickel 20 % and Chromium 25 % with cost of Rs. 220/- per Kg), AISI 305 (Nickel 12 % and Chromium 18 % with cost of Rs. 185/- per Kg) and AISI 316 (Nickel 12 % and Chromium 17 % with cost of Rs. 220/- per 250/- Kg)

 Currently 1500 Tons of AISI 310 grade scrap, 2000 Tons of AISI 305 grade scrap and 2250 Tons of AISI 316 grade scrap is available. The company wish to produce 2500 Tons of AISI 304 grade steel and 1000 Tons of AISI 321 grade stainless steel using a combination of above available scrap. Analyze situation and suggest best production plan to Supreme Steels Limited.  **(8 marks)**

Q5. Lux, Vivel and Godrej No. 1 are three competition bathing soap brands. Mr. Ronnie D’Souza, the brand manager of Lux in Western India wanted to project market share in 2025 for his brand. So, he engaged a market research firm to carryout brand switching survey among youth. The following results were obtained.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Resp. No.** | **Current Brand** | **Brand Preference in 2024** |  | **Resp. No.** | **Current Brand** | **Brand Preference in 2024** |
| 1 | Lux | Godrej No. 1 |  | 26 | Lux | Lux |
| 2 | VIVEL | Lux |  | 27 | Lux | Lux |
| 3 | Godrej No. 1 | Godrej No. 1 |  | 28 | VIVEL | Lux |
| 4 | VIVEL | Lux |  | 29 | Lux | VIVEL |
| 5 | Lux | Lux |  | 30 | Godrej No. 1 | VIVEL |
| 6 | Lux | Godrej No. 1 |  | 31 | VIVEL | Lux |
| 7 | VIVEL | Lux |  | 32 | Lux | Lux |
| 8 | Lux | VIVEL |  | 33 | Lux | Lux |
| 9 | Lux | VIVEL |  | 34 | VIVEL | VIVEL |
| 10 | VIVEL | VIVEL |  | 35 | Lux | VIVEL |
| 11 | Godrej No. 1 | Godrej No. 1 |  | 36 | VIVEL | VIVEL |
| 12 | VIVEL | Lux |  | 37 | Lux | Lux |
| 13 | Godrej No. 1 | Godrej No. 1 |  | 38 | VIVEL | Lux |
| 14 | VIVEL | VIVEL |  | 39 | Godrej No. 1 | Lux |
| 15 | Lux | VIVEL |  | 40 | VIVEL | Lux |
| 16 | Lux | Lux |  | 41 | Lux | Godrej No. 1 |
| 17 | Godrej No. 1 | Godrej No. 1 |  | 42 | VIVEL | VIVEL |
| 18 | VIVEL | VIVEL |  | 43 | Godrej No. 1 | Lux |
| 19 | Lux | VIVEL |  | 44 | VIVEL | VIVEL |
| 20 | VIVEL | VIVEL |  | 45 | Godrej No. 1 | VIVEL |
| 21 | Godrej No. 1 | Lux |  | 46 | Lux | Lux |
| 22 | Lux | VIVEL |  | 47 | Lux | Godrej No. 1 |
| 23 | VIVEL | Lux |  | 48 | VIVEL | VIVEL |
| 24 | Lux | Lux |  | 49 | Lux | Lux |
| 25 | VIVEL | VIVEL |  | 50 | Lux | Lux |

Analyze the situation and suggest further course of action to Mr. Ronnie.  **(8 marks)**