The Bhawanipur Education Society College

M.Com. 2nd Semester Examination, 2021 (Internal Evaluation)

Paper Code– CC203

Paper Name- Operations Research

Full Marks 15

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Module -I

Answer any one question ***1x7.5= 7.5***

1. A retired person wants to invest up to an amount of Rs.3,00,000 in shares. His broker recommends investing in two shares: Share A expected to yield 14% and Share B expected to yield 20%. After some consideration he decides to invest at most Rs.1,20,000 in Share B and at least Rs.60,000 in Share A. He also wants the amount invested in Share A to be at least equal to the amount invested in Share B. What should the broker recommend regarding allocation of investible fund, if the investor wants to maximize his return on investment? Solve graphically. [3.5+4]

OR

Frontier Bakery keeps stock of a popular brand of cake. Daily demand based on past experience is as given below: - Experience indicates

Daily demand: 0 15 25 35 45 50

Probability: .01 .15 .20 .50 .12 .02

Consider the following sequence of random numbers: - R. No. 48, 78, 09, 51, 56, 77, 15, 14, 68, 09 Using the sequence, simulate the demand for the next 10 days. Find out the stock situation if the owner of the bakery decides to make 35 cakes every day. Also estimate the daily average demand for the cakes on the basis of simulated data. (7.5)

2. The captain of a cricket team has to allot 5 middle order batting position to 5 batsmen. The average runs scored by each batsman at these positions are as follows:

Batsmen	Batting Orders				
	1 down	2 down	3 down	4 down	5 down
A	40	40	35	25	50
B	42	30	16	25	27
C	50	48	40	60	50
D	20	19	20	18	25
E	58	60	59	55	53

Assign the batsmen to different batting orders which would give the maximum runs. [7.5]

OR

For the pay-off matrix given below, find the optimal strategies for the players and value of the game. (7.5)

		Player B	
		B_1	B_2
Player A	A_1	8	–3
	A_2	–3	1

Module -II

Answer any one question ***1x7.5= 7.5***

3. Sri Ram Automobile Workshop has a central store where service mechanics arrive to take spare parts for the jobs they work upon. The mechanics wait in queue if necessary and are served on a first-cum-first-served basis. The store is manned by one attendant who can attend 8 mechanics in an hour on an average. The arrival rate of the mechanics averages 6 per hour. Assuming that the pattern of mechanics' arrivals is Poisson distributed and the servicing time is exponentially distributed, determine the following:
(i) Expected time spent by a mechanic in the system
(ii) Expected time spent by the mechanic in the queue
(iii) Expected number of mechanics in the queue [2.5+2.5+2.5]

OR

Activity	**Duration**
1–2	4 days
1–3	12 days
1–4	10 days
2–4	8 days
2–5	6 days
3–6	8 days
4–6	10 days
5–7	10 days
6–7	0 days
6–8	8 days

7–8 10 days

8–9 6 days

With the help of the activities given above draw a network. Determine its critical path, earliest start time, earliest finish time, latest start time, and latest finish time. (7.5)

4. The data on the operating cost per year and resale price of equipment A whose purchase price is Rs.10,000 are given below:

Year	1	2	3	4	5	6	7
Operating Cost (in Rs.)	1,500	1,900	2,300	2,900	3,600	4,500	5,500
Resale Value (in Rs.)	5,000	2,500	1,250	600	400	400	400

What is the optimum period for replacement of equipment A? When equipment A is 2 years old, equipment B, which is a new model for the same purpose, is available. The optimum period for replacement of equipment B is 4 years with an average cost of Rs.3,600. Shall equipment A be changed with equipment B? If yes, when shall it be replaced? [5+2.5]

OR

A) Calculate the Economic Order Quantity from the following information. Also state the number of orders to be placed in a year. Consumption of materials per annum : 10,000 kg.

Order placing cost per order : ₹ 50

Cost per kg. of raw materials : ₹ 2

Storage costs : 8% on average inventory (3)

B) A Company manufactures a special product which requires a component ‘Alpha’. The following particulars are collected for the year 2021: (i) Annual demand of Alpha 8,000 units (ii) Cost of placing an order ₹ 200 per order (iii) Cost per unit of Alpha ₹ 400 (iv) Carrying cost p.a. 20%

The company has been offered a quantity discount of 4 % on the purchase of ‘Alpha’ provided the order size is 4,000 components at a time.

Required : (i) Compute the economic order quantity (ii) Advise whether the quantity discount offer can be accepted. (2+2.5)