UNIVERSITY OF NORTH BENGAL

BBA. LL.B. (5 yr.) Honours 2nd Semester Examination, 2021

OPERATIONS RESEARCH

PAPER CODE- FC04

Time Allotted: 2 Hours   Full Marks: 50

The figures in the margin indicate full marks.
All symbols are of usual significance.

**The students should attempt questions any *two* questions from Group B
compulsorily and any *four* from Group A**

GROUP-A

Answers Word Limit less than equals to 200   10×4 = 40

1. Customers arrive at a milk parlour being manned by a single Individual at rate of 25 per hour. The time required to serve a customer has exponential distribution with a mean of 30 per hour. Discuss the various characteristics of the queuing system, assuming that there is only one server i.e. find the following: 10

   (i) Expected number of units in system
   (ii) Expected queue length
   (iii) Expected waiting time in the queue.

2. Solve using the Simplex method the following problem   10
   (Non-graphically)

   Maximize $z = 40x_1 + 30x_2$

   Subject to $x_1 + x_2, \le 12$

   $2x_1 + x_2, \le 16$

   $x_1, x_2, \ge 0$

3. Solve the following Transportation Problem by the help of: 10

   (i) Vogel's Approximation Method

   (ii) North West Corner Cell Method

		Destinations			
		kanpur	Pune	Delhi	Supply
	Jaipur	4	5	1	40
sources	Udaipur	3	4	3	60
	Mumbai	6	2	8	70
	Demand	70	40	60	170

4. Explain the Critical Path Method and Project Evaluation and Review Technique. 10

5. An investor is considering investing in two securities 'A' and 'B'. The risk and return associated with these securities is different. Security 'A' gives a return of 9% and has a risk factor of 5 on a scale of zero to 10. Security 'B' gives return of 15% but has risk factor of 8. 10

   Total amount to be invested is Rs. 5, 00, 000/- Total minimum returns on the investment should be

   12%. Maximum combined risk should not be more than 6. Formulate as LPP.

6. A small project is composed of nine activities whose time estimates are listed in the following table: 5+2.5+2.5

Activity	t_0	t_p	t_m
1-2	5	10	8
1-3	18	22	20
1-4	26	40	33
2-5	16	20	18
2-6	15	25	20
3-6	6	12	9
4-7	7	12	10
5-7	7	9	8
6-7	3	5	4

   (a) Find the expected task time and their variance.

   (b) Earliest and latest expected time of each node.

   (c) Draw the network diagram.

GROUP B

Answers Word Limit less than equals to 100

7. Write short notes on any *two* of the following: $5 \times 2 = 10$

   (a) Uses of Operation Research

   (b) Advantages of Transportation Problems

   (c) Scope of Operations Research

   (d) Importance of Operations Research.

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