उत्तर बङ्ग

विश्वविद्यालय

'समानो मन्त्रः समितिः समानी'

UNIVERSITY OF NORTH BENGAL

BBA LL.B. Honours 2nd Semester Examination, 2022

OPERATIONS RESEARCH

PAPER CODE: FC04

Time Allotted: 3 Hours   Full Marks: 100

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

The students are advised to follow the word limit mentioned below strictly while answering questions.
The marks will be deducted if answers exceed word limit. 20 marks- not more than 2000 words / 15 marks- not more than 1500 words / 10 marks- not more than 1000 words / 5 marks- not more than 500 words

Answer questions number 7 and any *four* questions from the rest

1. Solve using the Simplex method, the following problem: (Non-graphically)   20

    Maximize $Z = f(x, y) = 3x + 2y$

    Subject to:
    $$2x + y \le 18$$
    $$2x + 3y \le 42$$
    $$3x + y \le 24$$
    $$x \ge 0, \ y \ge 0$$

2. Solve the following transportation problem by the help of   10+10

    (i) Vogel's Approximation Method

    (ii) Least cost / count Method

	D_1	D_2	D_3	D_4	Supply (S)
O_1	3	1	7	4	250
O_2	2	6	5	9	350
O_3	8	3	3	2	400
Demand (D):	200	300	350	150	

    (Sources — O_1, O_2, O_3)

3. Draw the network diagram for the following project and find the critical path and maximum time for completion of the project.   10+6+4

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Preceded by	—	A	A	B	B	C	C	F	D	G, H	E	I
Duration	10	9	7	6	12	6	8	8	4	11	5	7

4. In a service department manned by one server, on an average 8 customers arrive every 5 minutes while the server can serve 10 customers in the same time assuming Poisson distribution for arrival and exponential distribution for service rate. Determine: 5+5+5+5

    (a) Average number of customers in the system.

    (b) Average number of customers in the queue.

    (c) Average time a customer spends in the system.

    (d) Average time a customer waits before being served.

5. A milk plant manufactures two types of products A and B and sells them at a profit of Rs. 5 on type A and Rs. 3 on type B. Each product is processed on two machines G and H. Type A requires one minute of processing time on G and two minutes on H. Type B requires one minute on G and one minute on H. The machine G is available for not more than 6 Hours 40 minutes, while machine B is available 8 hours 20 minutes during a working day. Formulate the problem as linear programming problem. 20

6. Explain the scope and evolution of the subject Operations Research. 10+10

7. Write short notes: (any *four* questions) $5 \times 4 = 20$

    (a) Critical Path Method (CPM)

    (b) Program Evaluation and Review Technique (PERT)

    (c) Importance of Operations Research

    (d) Transportation Problem

    (e) Saddle Point

    (f) Linear Programming Problem.

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