SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS APRIL-2022
SEMESTER - VI
13UMACE6003 **&** UMA/CE/6003 - **Operations Research**

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. A Firm manufacture two types of products A and B and sells them at a profit of Rs.2 on type A and Rs.3 on type B. Each product is processed on two machines M_1 and M_2.Type A requires 1 minute of processing time on M_1 and 2 minutes on M_2.Type B requires 1 minute on M_1 and 1 minutes on M_2. Machine M_1 is available for not more than 6 hours 40 minutes while machine M_2 is available for 10hours during any working day. Formulate the problem as a LPP so as to maximize the profit.
2. Solve the following LPP by simplex method:
   Maximize $Z=3x_1+2x_2$
   Subject to $2x_1+x_2 \leq 2$
   $3x_1+4x_2 \leq 12$
   And $x_1, x_2 \geq 0$.
3. Find all the basic solutions to the following problem:
   Maximize $Z=x_1+3x_2+3x_3$
   Subject to $x_1+2x_2+3x_3=15$
   $2x_1+3x_2+5x_3=10$
   Also find which of the basic solutions are
   i) basic feasible
   ii) non degenerate basic feasible
   iii) optimal basic feasible
4. Find the optimal transportation cost of the following matrix using LCM method.

	A	B	C	D	E	Available
P	4	1	2	6	9	100
Q	6	4	3	5	7	120
R	5	2	6	4	8	120
Demand	40	50	70	90	90	

Contd...

5. A batch of 4 jobs can be assigned to 5 different machines. The set up time (in hours) for each job on various machines is given below:

Machine

Jobs	I	II	III	IV	V
1	10	11	4	2	8
2	7	11	10	14	12
3	5	6	9	12	14
4	13	15	11	10	7

Find an optimal assignment of jobs to machines which will minimize the total set up time.

6. There are five jobs to be done in machine A and Machine B .The Processing times of the two machines are given in hours.

jobs	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	6

Find the sequencing of the jobs. Also calculate the total time elapsed and idle time of two jobs.

7. Determine the minimum time needed to process the two jobs on four machines M_1,M_2, M_3,M_4. The technological order for these jobs is as given below:

Job1	M_1	M_2	M_3	M_4
Job2	M_4	M_2	M_1	M_3

Processing time are as given below:

	M_1	M_2	M_3	M_4
Job1	5	7	8	4
Job2	5	8	6	9

8. Draw the network for the following data:

Activity	Duration (hrs)	Activity	Duration (hrs)
1-2	1	4-6	5
2-3	5	4-7	9
2-4	3	5-7	4
3-5	4	6-7	2
4-5	2	7-8	2

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Solve the following Linear Programming problem using graphical method

Maximize Z=$5x_1+3x_2$

Subject to $3x_1+5x_2 \leq 15$

$5x_1+2x_2 \leq 10$

And $x_1, x_2 \geq 0$

Contd...

10. Use two phase simplex method to solve
    Maximize z=5x_1+x_2
    Subject to constraints
    3x_1+2x_2≥3
    x_1+4x_2≥4
    x_1+x_2≤5
    and x_1≥0,x_2≥0

11. Find the intial basic feasible solution for the following transportation problem by VAM.

	I	II	III	IV	Availability
	10	11	4	2	1250
Origin	7	11	10	14	2300
	5	6	9	12	3400
Requirement	200	225	275	250	

12. Solve the following sequencing problem, giving an optimal solution when passing is not allowed.

jobs	A	B	C	D	E
M1	10	12	8	15	16
M2	3	2	4	1	5
M3	5	6	4	7	3
M4	14	7	12	8	10

13. Calculate the earliest start, earliest finish, Latest start and Latest finish of each activity of the project given below and determine the critical path method of the project.

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration	8	7	12	4	10	3	5	10	7	4

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