

CDOE
MASTER OF COMPUTER APPLICATIONS (CBCS-2019 COURSE)
M.C.A. SEM - V : WINTER :- 2021
SUBJECT: OPTIMIZATION TECHNIQUES

Day : Wednesday
Date 23-02-2022

W-22261-2021

Time : 10:00 AM-01:00 PM
Max. Marks: 60

N.B.

- 1) Q. No. 4 from Section I is **COMPULSORY**.
- 2) Answer **ANY TWO** questions from Q.No.1,2,3 in Section – I.
- 3) Answer **ANY TWO** questions from Q.No.5,6,7 in Section – II.
- 4) All questions carry **EQUAL** marks.
- 5) Answer to both the sections should be written in **SAME** answer book.
- 6) Draw a labeled diagram **WHEREVER** necessary.

SECTION – I

Q.1 A company can produce two products A & B. each product has to be processed by three machines X,Y,Z. (12)

Machine X can be operated for a total time of 2700 minutes. It takes 11 min. for an item A and 5 minutes for an item B. Machine Y can be operated for 2000 minutes and it takes 5 min. for an item A and 10 min. for B. Machine Z can be operated for total time of 450 min and it takes 1 min. for A and 2 min. for B. The profit per item of A is Rs. 10 and per item of B is Rs. 15.

Find the number of unit of A and B to be produces so as to maximize the profit. Solve by graphical method.

Q.2 Find initial solution by NWCR and LCM. (12)

	D ₁	D ₂	D ₃	D ₄	Availability
S ₁	5	4	3	6	50
S ₂	2	5	4	2	40
S ₃	3	1	2	1	20
Demand	25	30	35	20	

Q.3 The following data gives cost incurred if a job is performed on different machine. (12)

There are 4 jobs and 4 machines, assigns jobs to machine so that total cost is minimized.

Machine	A	B	C	D
M ₁	3	8	5	9
M ₂	4	2	1	6
M ₃	3	8	5	7
M ₄	4	7	10	8

Q.4 Write short notes on **ANY TWO** of the following: (12)

- a) Decision Tree with examples
- b) Applications of Operations Research
- c) Simulation model

SECTION - II

Q.5 Customers arrive at the first class ticket-counter of a theatre at rate of 12 per hour. (12)
There is one clerk serving the customers at a rate of 30 per hour,

- i) what is the probability that there is no customer in the counter?
- ii) what is the probability that there are more than 2 customers in the counter?

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Q.6 Use the simplex method to solve the linear programming problem (12)

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

Subject to constraints

$$2x_1 + 3x_2 \leq 8$$

$$2x_2 + 5x_3 \leq 10$$

$$3x_1 + 2x_2 + 4x_3 \leq 15$$

and $x_1, x_2, x_3 \geq 0$.

Q.7 A research project consists of eleven activities identified by their beginning (i) and ending nodes (j) as under. Three time estimates have also been specified against each activity. (12)

Estimated duration (weeks)

Activity (i-j)	Optimistic time (a)	Most likely time (m)	Pessimistic time (b)
1-2	6	7	8
1-3	4	5	12
1-4	2	10	12
2-5	3	7	11
3-6	10	20	48
3-7	6	9	18
4-6	3	3	09
5-8	3	3	09
6-9	8	18	40
7-8	2	6	10
8-9	2	5	14

- Calculate expected time of each activity.
- Construct the network diagram for the above project.
- Enter the expected time of the activities computed under (i) into the network.
