

Printed Pages- 8

Roll No.

576311(76)/676311(76)

**M. B. A. (Third Semester) Examination,
Nov.-Dec. 2021**

(New Scheme)

(Specialization : General)

(Management Branch)

OPTIMIZATION METHODS

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 32

**Note : All units questions are compulsory. Attempt
any two of each unit.**

Unit-I

Any two

1. (a) List the process of optimisation method. 4
- (b) Define Degeneracy condition in LPP. 2

(c) Define Post-optimality.

2

2. Solve the following LPP using simplex method

$$\text{Max } Z = 300 x_1 + 200 x_2$$

Subject to constraints

$$2x_1 + x_2 \leq 60$$

$$x_1 \leq 25$$

$$x_2 \leq 35$$

where $x_1, x_2 \geq 0$

8

3. An animal feed company must produce 200 kg of a mixture consisting of ingredients x_1 and x_2 . The ingredients x_1 costs Rs. 3 per kg and x_2 costs Rs. 5 per kg. Not more than 80 kg of x_1 can be used and atleast 60 kg of x_2 must be used. Find the minimum cost mixture.

8

Unit-II

Any two

1. A company manufacturing air coolers has two plants located at Bombay and Calcutta with a weekly capacity

of 200 units and 100 units respectively. The company supplies air coolers to its 4 show rooms situated at Ranchi, Delhi, Lucknow and Kanpur, which have a demand of 75, 100, 100 and 30 units respectively. The cost per unit (in Rs.) is shown in the following table. 8

Plants	Ranchi	Delhi	Lucknow	Kanpur
Bombay	90	90	100	100
Calcutta	50	70	130	85

Plan the production programme so as to minimise the total cost of transportation.

2. Find optimal solution for the problem.

8

Cost Matrix

	P	Q	R	Supply
A	4	8	8	76
B	16	24	16	82
C	8	16	24	77
Demand	72	102	41	

3. Find initial basic feasible solution using LCM.

8

	w	x	y	z	Demand
A	6	6	11	15	80
B	4	6	10	12	120

[4]

C	6	4	7	6	150
D	4	10	14	14	65
E	8	8	7	9	85
Supply	100	120	120	80	

Unit-III **Any two**

1. Five men are available to do five different jobs. From the past records the time (in hrs) that each man takes to do a job is known and is given in the following matrix. 8

Jobs

Men	I	II	III	IV	V
A	2	9	2	7	1
B	6	8	7	6	1
C	4	6	5	3	1
D	4	2	7	3	1
E	5	3	9	5	1

2. ABC air lines operating seven days a week has given the following time table. Crews must have a minimum lay-over of 5 hours between flights. Obtain the pairing flights that minimise lay-over time away from time. For any given pairing the crew will be based at the city that results the smallest lay-over. 8

576311(76)/676311(76)

[5]

Raipur-Nagpur			Nagpur-Raipur		
Flight No.	Departure	Arrival	Flights	Departure	Arrival
A ₁	6 AM	8 AM	B ₁	8 AM	10 AM
A ₂	8 AM	10 AM	B ₂	9 AM	11 AM
A ₃	2 PM	4 PM	B ₃	2 PM	4 PM
A ₄	8 PM	10 PM	B ₄	7 PM	9 PM

3. A salesman has to visit four cities A, B, C and D. The distances (in hundred km) between the four cities are as follows :

	To			
From	A	B	C	D
A	-	4	7	3
B	4	-	6	3
C	7	6	-	7
D	3	3	7	-

If the salesman starts from city A and has to come back to city A, which route should he select so that the total distance travelled by him is minimised? 8

Unit-IV **Any two**

1. (a) What is Queuing theory? In what areas of management can it be applied successfully? Give some examples. 3

576311(76)/676311(76)

PTO

[6]

- (b) Write assumptions of MM1/FCFS/ ∞ . 2
- (c) Explain general structure of Queuing system. 3
2. On a national highway automobiles arrive for toll tax payment at an average rate of 3 in 5 minutes, according to poisson probability law. The attendant receives the tax in an average time of one minute per customer. The services time is exponential distributed. Find :
- (a) The probability of arrivals of 0 through 5 customers in a 10-minutes interval.
- (b) The average time that the attendant is free in his 8-hour duty time.
- (c) The expected number of customer in the system.
- (d) The expected time of the customer in the system. 8
3. A company has six jobs which go through three machine X, Y and Z in the order XYZ. The processing time in minutes for each job on each machine is as follows :

Machine	Jobs					
	1	2	3	4	5	6
X	18	12	29	35	43	37
Y	7	12	11	2	6	12
Z	19	12	23	47	28	36

What should be the sequence of the jobs? 8

576311(76)/676311(76)

[7]

Unit-V

Any two

1. Wha is the difference between CPM and PERT. 8
2. Tasks A,B,C,D,, H, I constitute a project. The precedence relationships are :
 $A < D; A < E; B < F; D < F; C < G; C < H; F < I; G < I$

Activity	1-2	1-4	1-3	2-4	2-6	4-5	3-5	3-6	5-6
	A	B	C	D	E	F	G	H	I
Time	8	10	8	10	16	17	18	14	9

Find :

- (i) Draw Network Diagram and critical path
- (ii) Calculate E_s, E_F
- (iii) Calculate L_s, L_F
- (iv) Total float 8
3. The time estimates (in weeks) for the activities of a PERT network are given below :

Activity	t_0	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	8
2-5	1	1	1

576311(76)/676311(76)

PTO

3-5	2	5	14
4-6	2	5	8
5-6	3	6	15

Find

- (i) Draw Network diagram and critical path.
- (ii) What is the probability that the project will be completed no more than 4 weeks (for week) later than expected time.
- (iii) The probability that project will complete in 20 weeks.

8

3. The time estimates (in weeks) for the activities of a PERT network are given below

Activity	t_o	t_m	t_p
1-2	1	1	7
1-3	1	4	7
1-4	2	2	2
2-5	1	1	1