



K20P 1254

Reg. No. :

Name :

V Semester Master of Computer Application (M.C.A.)/M.C.A. (Lateral Entry) Degree (C.B.S.S.-Reg./Suppl. (Including Mercy Chance) Imp.)

Examination, November 2020

(2014 Admission Onwards)

Elective – III : MCA 5E09 : OPERATIONS RESEARCH

Time : 3 Hours

Max. Marks : 80

- Instructions :** 1) Answer **any ten** questions from Section – A. Each question carries **three** marks.
2) Answer **all** questions from Section – B. Each question carries **ten** marks.

SECTION – A

Note : Answer **any ten** questions. Each question carries **three** marks.

1. What are slack and surplus variables ?
2. Write the steps involved in two-phase simplex method.
3. What is the essential difference between regular simplex and dual simplex method ?
4. What is the concept involved in the Gomory's cutting plane method ?
5. What do you mean by degenerate transportation problem ?
6. What do you mean by Travelling Salesman problem ?
7. Give the mathematical formulation of an assignment problem.
8. What do you mean by dummy activity ? Why it is used in networking ?
9. What are optimistic, pessimistic and normal time estimate in PERT calculations ?
10. What are the characteristics of a Queuing model.
11. Write a short note on discrete parameter Markov chains.
12. Write a short note on classification of stochastic process. (10×3=30)

P.T.O.



SECTION - B

Note : Answer **all** questions. **Each** question carries **ten** marks.

13. a) Use two phase simplex method to solve the problem.

$$\text{Minimize } Z = ((15/2)x_1) - (3x_2)$$

Subject to the constraints

$$3x_1 - x_2 - x_3 \geq 3$$

$$x_1 - x_2 + x_3 \geq 2$$

$$\text{And } x_1, x_2, x_3 \geq 0$$

OR

- b) A company has 5 jobs to be done. The following matrix shows the return in rupees on assigning i th ($i = 1, 2, 3, 4, 5$) machine to the j th job ($j = A, B, C, D, E$) Assign the five jobs to the five machines so as to maximize the total expected profit.

	A	B	C	D	E
1	5	11	10	12	4
2	2	4	6	3	5
3	3	12	5	14	6
4	6	14	4	11	7
5	7	9	8	12	5

14. a) A travelling salesman has to visit 5 cities. He wishes to start from a particular city, visit each city once and then return to his starting point. Cost of going from one city to another is shown below. You are required to find the least cost route.

	To city				
From city	A	B	C	D	E
A	∞	4	10	14	2
B	12	∞	6	10	4
C	16	14	∞	8	14
D	24	8	12	∞	10
E	2	6	4	16	∞

Determine the optimum solution to maximize the total returns.

OR

b) Use d
Maxim
Subje

11. a) Use
pro

Ma
Su

10

A

b)

16. a)

10



b) Use dual simplex method to solve the LPP.

Maximize $Z = -3x_1 - 2x_2$

Subject to $x_1 + x_2 \geq 1$

$x_1 + x_2 \leq 7$

$x_1 + 2x_2 \geq 10$

$x_2 \leq 3$

And $x_1, x_2 \geq 0$

10

a) Use Branch and Bound method to solve the following integer programming problem.

Maximise $z = 3x_1 + 4x_2$

Subject to $7x_1 + 16x_2 \leq 52$

$3x_1 - 2x_2 \leq 18$

And $x_1, x_2 \geq 0$ and integers.

10

OR

b) What is integer programming problem? Write a note on cutting plane algorithm.

10

16. a) A small maintenance project consists of the following jobs whose precedence relationship is given below.

Job	1-2	1-3	2-3	2-5	3-4	3-6	4-5	4-6	5-6	6-7
Duration (Days)	15	15	3	5	8	12	1	14	3	14

i) Draw an arrow diagram representing the project.

ii) Find the total float for each activity.

iii) Find the critical path and the total project duration.

10

OR



- b) Find an optimal sequence for the following sequencing problem of four jobs and five machines when passing out is not allowed of which processing time (in hours) is given below :

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

Also find the total elapsed time.

10

17. a) A super market has two salesmen ringing up sales at the counters. If the service time for each customer is exponential with mean 4 minutes and if people arrive in a Poisson fashion at the counter at the rate of 10 per hour.
- Calculate the probability that an arrival will have to wait for service.
 - Find the expected percentage of idle time for each salesman.
 - If a customer has to wait, find the expected length of his waiting time.

10

OR

- b) Explain in detail about the stochastic process and classification of stochastic process.

10

(5×10=50)