PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF COMMERCE
END TERM EXAMINATION - JUN 2023

Semester : Semester II - 2022   **Date :** 12-JUN-2023
Course Code : BSE2006   **Time :** 1.00PM - 4.00PM
Course Name : Sem II - BSE2006 - Operations Research   **Max Marks :** 100
Program : BSE   **Weightage :** 50%

Instructions:
(i) Read all questions carefully and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and non-programmable calculator are permitted.
(iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS   (10 X 2 = 20M)

1. Describe unbonded solution for linear programming problem.

(CO2) [Knowledge]

2. Considering the graphical method for a linear programming problem the points are lying in the common region will satisfy all the constraints simultaneously, then the common region is state as _____

(CO1) [Knowledge]

3. Describe the term slack variable and why it is useful to solve a linear programming problem.

(CO1) [Knowledge]

4. Define Optimal basic feasible solution.

(CO2) [Knowledge]

5. Define the term Slack Variable and give a suitable example.

(CO1) [Knowledge]

6. In the assignment problem, if there is no assignment in a _____, then it implies that the total number of assignments are _____ the number of rows/columns in the square matrix.

(CO3) [Knowledge]

7. Define the term operation research, also explain briefly why it is needed.

(CO1) [Knowledge]

8. State non degenerate solution in context of basic feasible solution.

(CO2) [Knowledge]

9. Describe the difference between PERT and CPM.

(CO4) [Knowledge]

10. Define the term looping and dangling.

(CO4) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS   (4 X 10 = 40M)

11. Write the initial simplex table for the below linear programming problem.

$Max\ (P) = 4x + 6y + z$

$Subject\ to\ constraint,$

$2x - y + 3z \leq 5$

$x \leq 2$

$x, y, z \geq 0.$

(CO2) [Comprehension]

12. Give a suitable example to formulate a real-world problem in operation research considering Pharmaceutical company and create the LPP for the same.

(CO1) [Comprehension]

13. Use North West corner Method (NWC) to find the initial basic feasible solution to the below transportation problem

Destination

		D_1	D_2	D_3	D_4	Supply
	S_1	19	30	50	10	7
Source	S_2	70	30	40	60	9
	S_3	40	8	70	20	18
Demand		5	8	7	14	34

(CO3) [Comprehension]

14. Solve the below question using Assignment method.
A department has five employees with five jobs to be performed. The time (in hours) each men take to perform each job is given in the effective matrix. How should the jobs be allocated, one per employee so as to minimize the total man hours?

Employees

		I	II	III	IV	V
	A	10	5	13	15	16
	B	3	9	18	13	6
Jobs	C	10	7	2	2	2
		7	11	9	7	12
	D	7	9	10	4	12

(CO4) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS   (2 X 20 = 40M)

15. An established company has decided to add a new product to its line. It will buy the product from a manufacturing concern, package it, and sell it to a number of distributors that have been selected on a geographical basis. Market research has already indicated the volume expected and the size of sales force required. The steps shown in the following table are to be planned. Find the critical activities and critical path of the project.

Activity	Description	Predecessors	Duration
A	Organize sales office	--------	6
B	Hire salesmen	A	4
C	Train Salesmen	B	7
D	Select advertising agency	A	2
E	Plan advertising campaign	D	4
F	Conduct advertising campaign	E	10
G	Design Package	----	2
H	Setup Packaging facilities	G	10
I	Package initial stocks	J, H	6
J	Order stock from Manufacturer	----	13
K	Select distributors	A	9
L	Sell to distributors	C, K	3
M	Ship stocks to distributors	I, L	5

(CO4) [Application]

16. For the given transportation problem to find the initial basic feasible solution using Vogel's Approximation Method (VAM).

Destination

		D_1	D_2	D_3	D_4	Supply
Source	S_1	19	30	50	10	7
	S_2	70	30	40	60	9
	S_3	40	8	70	20	18
	Demand	5	8	7	14	34

(CO3) [Application]