

ADMISSION NUMBER									

**School of Business**  
**Bachelor of Business Administration**  
**Semester End Examination - Nov 2023**

**Duration : 180 Minutes**  
**Max Marks : 100**

**Sem V - D1UA508T - Operations Research**

General Instructions

*Answer to the specific question asked*

*Draw neat, labelled diagrams wherever necessary*

*Approved data hand books are allowed subject to verification by the Invigilator*

- 1) What are the benefits of Assignment Problem? K1 (2)
- 2) Explain the various steps of Vogel's Approximation Method of Transportation Problem. K2 (4)
- 3) Illustrate the utility of Network Analysis with the help of real life corporate example. K2 (6)
- 4) An officer to put four executives to four different jobs. The executives have somewhat different kinds of skills, and they exhibit different levels of efficiency from one job to another. The officer has estimated the number of manhours that would be required for each job-man combination is given in the below matrix: K3 (9)

Job Man	A	B	C	D
1	10	6	4	16
2	14	18	4	12
3	12	8	10	14
4	10	14	14	16

Find the optimum assignment that will result in the minimum man-hours needed.

- 5) Use Graphical Method to solve the following LP problem Maximize  $Z = 15x_1 + 10x_2$ . K3 (9)  
 Subject to the constraints:  
 $4x_1 + 6x_2 \leq 360$ ;  
 $3x_1 + 0x_2 \leq 180$ ;  
 $0x_1 + 5x_2 \leq 200$ ;  
 $x_1 \geq 0, x_2 \geq 0$
- 6) Elaborate the importance of various time values in network analysis. K5 (10)

7) Examine the utility of CPM/ PERT tool for any project work, by taking any example. K4 (12)

8) A paper mill produces 2 grades of paper namely x and y. Because of raw material restrictions, it cannot produce more than 400 tonnes of grade x and 300 tonnes of grade y in a week. There are 160 production hours in a week. It requires 0.2 hours and 1.4 hours to produce a tone of product x and y respectively, with corresponding profits of Rs.200 and Rs.500 per ton. Formulate the above LPP and recommend the solution to the management of paper mill to maximize the profit. K5 (15)

9) A company is producing three products *P1*, *P2* and *P3*, with profit contribution of Rs.20, Rs.25 and Rs.15 per unit respectively. The resource requirements per unit of each of the products and total availability are given below. K5 (15)

Product	<i>P1</i>	<i>P2</i>	<i>P3</i>	Total Availability
Man Hours / unit	6	3	12	200
Machine Hours / unit	2	5	4	350
Material / unit	1kg	2kg	1kg	100kg

Formulate the above as a linear programming model.

10) A project schedule has the following characteristics. K6 (18)

Activity	Expected duration (Weeks)		
	Optimistic	Most likely	Pessimistic
1-2	1	1	5
2-3	1	2	3
2-4	1	3	5
3-5	3	4	5
4-5	2	3	4
4-6	3	5	7
5-7	4	5	6
6-7	6	7	8
7-8	2	4	6
7-9	5	6	8
8-10	1	2	3
9-10	3	5	7

(a) Draw the project network and trace all the possible paths from it.

(b) Determine the critical path and the expected project time.

(c) What is the probability that the project will be completed in 26 weeks?