LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

U.G. DEGREE EXAMINATION – **ALLIED**

FIRST SEMESTER – **NOVEMBER 2023**

UCS 1301 – OPERATIONS RESEARCH

Date: 09-11-2023 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 NOON

	SECTION A - K1 (CO1)	
	Answer ALL the Questions -	**(10 x 1 = 10)**
1.	**Definitions**	
a)	Operations research.	
b)	Optimum Solution.	
c)	Idle time.	
d)	PERT.	
e)	Total inventory cost.	
2.	**Fill in the blanks**	
a)	_____can be used only for a two variables problem.	
b)	Unbalance TP If total supply is not equal to total demand, then it balances with _____ source or destination.	
c)	Since any of the condition min{MACHINE A}≥max{MACHINE B} and/or min{MACHINE C}≥max{MACHINE B} is satisfied. so given problem can be converted to _____.	
d)	Network is also called _____diagram.	
e)	The nature of _____ must be known for inventory control.	
	SECTION A - K2 (CO1)	
	Answer ALL the Questions	**(10 x 1 = 10)**
3.	**Match the following**	
a)	Identification of problem -- i) Reorder Point	
b)	Supply != Demand -- ii) Activity oriented	
c)	Depreciation cost -- iii) Unbalanced transportation problem	
d)	CPM -- iv) Cost price - Scrap value	
e)	ROP -- v) Steps of OR	
4.	**True or False**	
a)	Linear equation Y = $8X^2$ - 9.	
b)	No job is allotted to more than one worker in assignment problem.	
c)	The sequencing problem involves the determination of an optimal order or sequence of performing a series of jobs by a number of facilities (that are arranged in a specific order) so as to optimize the total time or cost.	
d)	PERT technique will be worked out with Optimistic time, Most likely time and Pessimistic time.	
e)	To calculate a reorder point with safety stock, divide the daily average usage by the lead time and add the amount of safety stock you keep.	

SECTION B - K3 (CO2)

Answer any TWO of the following **(2 x 10 = 20)**

5. Solve by Simplex Method.
MAX Z = 7X1 + 4X2
subject to
2X1 + X2 <= 20
X1 + X2 <= 18
X1 <= 8
and X1,X2 >= 0

6. Find Solution using Voggel's Approximation method.

	D1	D2	D3	D4	Supply
S1	6	3	5	4	22
S2	5	9	2	7	15
S3	5	7	8	6	8
Demand	7	12	17	9	

7. A machine cost Rs 9000. The annual cost is Rs 200 for the first year and is then increased by Rs 2000per year for subsequent years. There is no scrap value. Determine the best age to replace the machine.

8. Compare the difference between PERT and CPM.

SECTION C – K4 (CO3)

Answer any TWO of the following **(2 x 10 = 20)**

9. Explain the scope of OR in management.

10. Find Solution of Assignment problem using Hungarian method.

Work\Job	A	B	C
1	6	3	5
2	5	9	2
3	5	7	8

11. Find solution of Processing 6 Jobs Through 3 Machines Problem.

Job	1	2	3	4	5	6
Machine-1	3	12	5	2	9	11
Machine-2	8	6	4	6	3	1
Machine-3	13	14	9	12	8	13

12. The annual demand for an item is 3200 units. The unit cost is Rs.6/- and inventory carrying charges 25% per annum. If the cost of one procurement is Rs.150/- determine:

i) Economic order quality.
ii) Time between two consecutive orders.
iii) Number of orders per year.
iv) The optimal total cost.

SECTION D – K5 (CO4)

Answer any ONE of the following **(1 x 20 = 20)**

13. Analyse the monthly production of A and B to maximise profit by graphical method. A company manufactures two products A and B. Both products are processed on two machines M1 & M2. Profit per unit for A is Rs. 100 and for B is Rs. 80.

	M1	M2
A	6 Hrs/Unit	2 Hrs/ Unit
B	4 Hrs/Unit	4 Hrs/ Unit
Availability	7200 Hrs/ Month	4000 Hrs/ Month

14. Solve the following problem, using Replacement Model

t	1	2	3	4	5	6	7	8
P(t)	0.05	0.13	0.25	0.43	0.68	0.88	0.96	1.0

The cost of individual replacement is Rs 4 per bulb. The Cost of group replacement is Rs 1 per bulb. If there are 1000 bulbs in use find the optimal replacement policy under

1. Individual replacement.
2. Group replacement.

SECTION E – K6 (CO5)

Answer any ONE of the following **(1 x 20 = 20)**

15. A salesman has to visit five cities A, B, C, D and E. The distance between any two cities are given in the following table. The salesman starts from A and has to come back to A after visiting all the other cities in a cycle. Which route he has to select in order that the total distance travelled by him is minimum?

Salesman	Sales Cities				
	A	B	C	D	E
1	x	2	5	7	1
2	6	x	3	8	2
3	8	7	x	4	7
4	12	4	6	x	5
5	1	3	2	8	x

16. A project schedule has the following characteristics as shown in the below table.

Activity	Name	Time
1-2	A	4
1-3	B	1
2-4	C	1
3-4	D	1
3-5	E	6
4-9	F	5
5-6	G	4
5-7	H	8
6-8	I	1
7-8	J	2
8-10	K	5
9-10	L	7

i)Construct the network diagram for the above problem.
ii)Find the critical path.
iii)Find the float value of each activity.

&&&&&&&&&&