S.NO:399   BATCH: 97- 2016   REG. NO.:

END OF SEMESTER EXAMINATIONS, NOVEMBER - 2018
OPERATIONS RESEARCH
SUBJECT CODE: 08UAMA08

MAJOR: B.SC., (MATHS)   **SEMESTER : IV**
TIME : 3 HOURS   **MAX. MARKS: 75**

SECTION – A (5 X 2 = 10)

Answer All the questions:

1. Define basic feasible solution in a LPP.

(OR)

2. What is the difference between slack variable and surplus variable?

3. Formulate the dual of the following linear programming problem:
   Maximize $z = 5x_1 + 3x_2$ subject to the constraints;
   $3x_1 + 5x_2 \leq 15, 5x_1 + 2x_2 \leq 10, x_1 \geq 0 \, and \, x_2 \geq 0$.

(OR)

4. Define primal problem and dual problem.

5. When does degeneracy occur in $m \times n$ transportation problem?

(OR)

6. Write the mathematical formulation of an assignment problem.

7. What is a sequencing problem?

(OR)

8. What is 'no passing' rule in a sequencing algorithm?

9. Define critical path.

(OR)

10. Write the formula to calculate variance in PERT.

SECTION – B (5 X 4 = 20)

Answer All the questions:

11. Use the graphical method to solve the following Lpp
    Minimize $z = -x_1 + 2x_2$ subject to the constraints;
    $-x_1 + 3x_2 \leq 10; x_1 + x_2 \leq 6; x_1 - x_2 \leq 2 \, \& \, x_1, x_2 \geq 0$.

(OR)

12. Explain the formulation of Lpp.

13. Write down the dual of the Lpp:
    Minimize $z = 4x_1 + 6x_2 + 18x_3$ subject to the constraints;
    $x_1 + 3x_2 \geq 3; x_2 + 2x_3 \geq 5 \, and \, x_1, x_2, x_3 \geq 0$

(OR)

14. Find the dual of the Lpp
    Maximize $z = 2x_1 + 3x_2 + x_3$ Subject to constraints:
    $4x_1 + 3x_2 + x_3 = 6; x_1 + 2x_2 + 5x_3 = 4; x_1, x_2, x_3 \geq 0$.

..2...

15. Obtain the initial basic feasible solution by NWC Method

	A	B	C	D	Supply
1	20	22	17	4	120
2	24	37	9	17	70
3	32	37	20	15	50
Demand	60	40	30	110	

(OR)

16. Solve the following assignment problem:

	1	2	3	4
A	9	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

17. Describe the method of processing 'n' jobs through two machines.

(OR)

18. Explain the assumptions made while dealing with sequencing problems.

19. Draw the network diagram for the following data

Activity:	A	B	C	D	E	F	G	H	I	J	K	L
Predecessor:	-	-	A	A	B	B	C,D	E	C,D	G,H	F	J,K

(OR)

20. Define: (i) optimistic time
   (ii) pessimistic time

SECTION – C (5 X 9 = 45)

Answer All the questions:

21. Solve the following Lpp by simplex method.
   Maximize $z = 4x_1 + 10x_2$ subject to the constraints;
   $2x_1 + x_2 \leq 50; 2x_1 + 5x_2 \leq 100 \, and \, x_1, x_2 \geq 0$

(OR)

22. Solve by Graphical method.
   Minimize $z = 20x_1 + 40x_2$ subject to the constraints;
   $3x_1 + 12x_2 \geq 36; 20x_1 + 10x_2 \geq 100 \, and \, x_1, x_2 \geq 0$

23. Use duality to solve the following Lpp
   Minimize $z = 20x_1 + 10x_2$ subject to the constraints;
   $x_1 + x_2 \geq 10; 3x_1 + 2x_2 \geq 24 \, and \, x_1, x_2 \geq 0$

(OR)

24. Use Dual simplex method to solve
   Maximize $z = -3x_1 - x_2$ subject to the constraints
   $x_1 + x_2 \geq 1; 2x_1 + 3x_2 \geq 2 \, and \, x_1, x_2 \geq 0$.

..3...

25. Obtain an initial basic feasible solution by Vogel's approximation method.

	D	E	F	G	Supply
A	40	25	22	33	200
B	44	35	30	30	60
C	38	38	28	30	140
Demand	200	40	120	40	

(OR)

26. Solve the following assignment problem.

Men

	E	F	G	H
A	18	26	17	11
B	13	28	14	26
C	38	19	18	15
D	19	26	24	10

Tasks

27. In a factory, there are 6 jobs to perform, each of which should go through two machines A and B in the order A.B. Determine the sequence for the 6 jobs that will minimize the total elapsed time.

Job:	J_1	J_2	J_3	J_4	J_5	J_6
Machine A:	1	3	8	5	6	3
Machine B:	5	6	3	2	2	10

(OR)

28. Determine the optimum sequence of jobs that minimizes the total elapsed time based on the information processing time on machines is given in hours & passing is not allowed.

Job:	A	B	C	D	E	F	G
Machine M_1	3	8	7	4	9	8	7
Machine M_2	4	3	2	5	1	4	3
Machine M_3	6	7	5	11	5	6	12

29. Find the critical path for each activity

Activity;	A	B	C	D	E	F	G	H	1
Predecessor:	-	-	-	A	B	C	D,E	B	H,F
Duration:	3	5	4	2	3	9	8	7	9

(OR)

30. Given the following data;

Activity:	1-2	1-3	1-4	2-5	3-5	4-6	5-6
t_0 :	1	1	2	1	2	2	3
t_m :	1	4	2	1	5	5	6
t_p :	7	7	8	1	14	8	15

1. What is the probability that the project will be completed atleast 4 weeks earlier than expected?

2. Calculate the Variance and Standard Deviation Given:

Z	0.50	1.33	2.00
P	0.3085	0.0918	0.0228

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