S. NO: 451 BATCH: 97-2015 Reg. No.:

END OF SEMESTER EXAMINATIONS, APRIL/MAY – 2017
OPERATIONS RESEARCH
SUBJECT CODE : 08UAMA08

MAJOR : B.Sc (Mathematics) SEMESTER : IV
TIME : 3 HOURS MAX. MARKS: 75

SECTION – A (5 x 2 = 10)

Answer all the Questions:

1. Define Operations Research.

[OR]

2. Define Degenerate Solution.
3. Define Dual problem..

[OR]

4. Write the dual of the primal problem given below

Minimize $z = 7x_1 + 3x_2 + 8x_3$

Subject to the Constraints

$8x_1 + 2x_2 + x_3 \geq 3$

$3x_1 + 6x_2 + 4x_3 \geq 4$

$4x_1 + x_2 + 5x_3 \geq 1$

$x_1 + 5x_2 + 2x_3 \geq 7 \qquad x_1, x_2, x_3 \geq 0$

5. Define Transportation problem.

[OR]

6. Define Assignment problem.
7. Define the Sequencing problem.

[OR]

8. What are the types of sequencing problem?
9. What are the errors in network?

[OR]

10. What is meant by PERT?

SECTION – B (5 x 4 = 20)

Answer all the Questions:

11. The manager of an oil refinery must decide on the optimum mix of 2 possible blending processes of which the inputs and outputs production run are as follows.

	Input		Output	
Process	Crude A	Crude B	Gasoline X	Gasoline Y
1	6	4	6	9
2	5	6	5	5

The maximum amounts available of Crudes A & B are 250 units and 200 units respectively. Market demand shows that atleast 150 units gasoline X and 130 units of gasoline Y must be produced. The profits of process 1 & 2 are Rs. 4 & Rs. 5 respectively. Formulate the problem for maximizing the profit.

[OR]

12. Solve the following L.P.P by Graphical method.

Maximize $z = x_1 + x_2$

Subject to the Constraints:

$x_1 + x_2 \leq 1$

$-3x_1 + x_2 \geq 3$

$x_1, x_2 \geq 0$

..2..

13. Use duality to solve the L.P.P.

Maximize $z = 3x_1 + 4x_2$

Subject to the Constraints

$$x_1 - x_2 \le 1$$
$$x_1 + x_2 \ge 4$$
$$x_1 - 3x_2 \le 3$$
$$x_1, x_2 \ge 0$$

[OR]

14. Explain formulation of a dual problem.
15. Explain North – West corner method.

[OR]

16. Find initial basic feasible solution by North West corner.

	D	*E*	*F*	*G*	*Method*
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
	200	225	275	250	

17. Explain 'n' jobs and 'm' machines

[OR]

18. We have five jobs, each of which must go through the two machines A & B in the order AB. Processing times in hours are given in the table below.

Jobs	:	1	2	3	4	5
Machine A	:	5	1	9	3	10
Machine B	:	2	6	7	8	4

Determine a sequence for the jobs that will minimize the elapsed time.

19. Explain Fulkerson's Rule.

[OR]

20. Tasks *A,B,C . . . H,I* constitute a project. The notation x<y means that the task x must be finished before y can begin. With the notation.

$A < D;\ A < E;\ B < F;\ D < F;\ C < G;\ C < H;\ F < I;\ G < I;$

Draw a graph to represent the sequence of tasks.

SECTION – C (5 x 9 = 45)

Answer all the Questions:

21. Solve the following L.P.P by simplex method

Maximize $z = x_1 - x_2 + 3x_3$

Subject to the Constraints

$$x_1 + x_2 + x_3 \le 10$$
$$2x_1 - x_3 \le 2$$
$$2x_1 - 2x_2 + 3x_3 \le 0$$
$$x_1, x_2, x_3 \ge 0$$

[OR]

22. Use two-phase simplex method to

Maximize $z = 5x_1 - 4x_2 + 3x_3$

Subject to the Constraints

$$2x_1 + x_2 - 6x_3 = 20$$
$$6x_1 + 5x_2 + 10x_3 \le 76$$
$$8x_1 - 3x_2 + 6x_3 \le 50$$
$$x_1, x_2, x_3 \ge 0$$

23. Explain Dual simplex algorithm.

[OR]

24. Use duality to solve the following L.P.P

Maximize $z = 2x_1 + x_2$

Subject to the Constraints

$$x_1 + 2x_2 \le 10$$
$$x_1 + x_2 \le 6$$
$$x_1 - x_2 \le 2$$
$$x_1 - 2x_2 \le 1$$
$$x_1, x_2 \ge 0$$

25. Find optimum solution to the following transportation problem.

		To			Available
From		7	3	4	2
		2	1	3	3
		3	4	6	5
Demand		4	1	5	

[OR]

26. Solve the following Assignment problem.

Salesman \ Area	I	II	III	IV	V
A	32	38	40	28	40
B	40	24	28	21	36
C	41	27	33	30	37
D	22	38	41	36	36
E	29	33	40	35	39

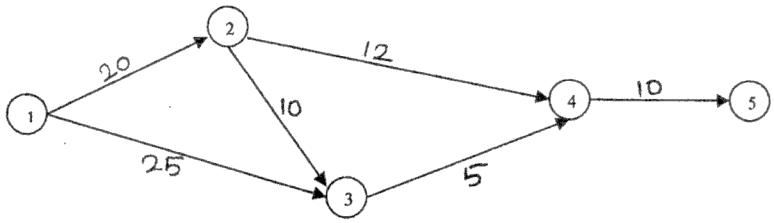
27. Solve the following sequencing problem when passing is not allowed.

Item \ Machine	A	B	C	D	E
I	9	7	4	5	11
II	8	8	6	7	12
III	7	6	7	8	10
IV	10	5	5	4	8

[OR]

28. Explain with 2 jobs and k machines.

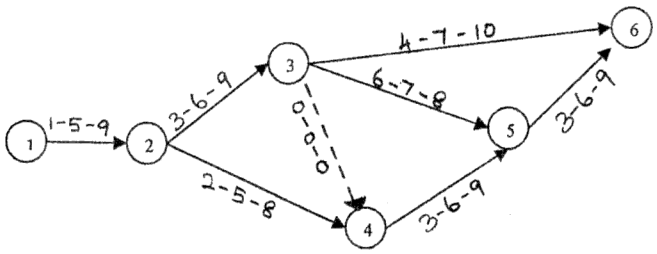
29.



Using the given information, find the Critical path.

[OR]

30. For the network given below, find the critical path. Find the probability of completing the project in
    i. 21 days
    ii. 19 days



* * * * *