27. Solve the following AP.

	A	B	C	D
W	8	7	9	10
X	7	9	9	8
Y	10	8	7	11
Z	10	6	8	7

28. Explain deterministic inventory problems with no shortages.

29. Explain the features of Network flow models.

30. Describe the rules of Network construction.

31. Find the critical path and duration of the project.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessor	--	A	B	A	D	E	--	G	H,J	--	A	K,C	I
Time in weeks	6	4	7	2	4	10	2	10	6	13	9	3	5

(5 x 8 = 40 Marks)

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(Pages: 4)   Name: ……….……………

Reg. No……….…………

THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2018
(Supplementary/Improvement)
(CUCBCSS-UG)
CC15U BCA3 C06 - OPERATIONS RESEARCH
(Complementary Course)
(2015 & 2016 Admissions)

Time: Three Hours   Maximum: 80 Marks

Part A
Answer *all* questions. Each question carries 1 mark.

1. Decision variables in an O.R. model are
   a) controllable   b) uncontrollable   c) parameters   d) constants

2. Which of the following is not associated with an L.P.P.?
   a) proportionality   b) uncertainty   c) additivity   d) divisibility

3. Given a system of m simultaneous linear equations in n unknowns $(m < n)$, the number of basic variables will be
   a) m b) n c) $n - m$ d) $n + m$

4. At any iteration of the usual simplex method, if there is atleast one basic variable in the basis at zero level and all $z_j - c_j \geq 0$, the current solution is
   a) infeasible   b) unbounded   c) non-degenerate   d) degenerate

5. If dual has an unbounded solution, primal has
   a) an unbounded solution   b) an infeasible solution
   c) a feasible solution   d) none of the above

6. The solution to a transportation problem with m sources n destinations is feasible if the number of allocations are
   a) $m + n - 1$ b) $m + n + 1$ c) $m + n$ d) mn

7. The minimum number of lines covering all zeros in a reduced cost matrix of order n can be
   a) at the most n.   b) at least n.   c) $n - 1$.   d) $n + 1$.

8. If the unit cost rises, optimum order quantity will
   a) increases   b) decreases
   c) either increases or decreases   d) none of the above

9. A minimal spanning tree involves
   a) all the nodes with cycles allowed.
   b) all the nodes with cycles not allowed.
   c) the shortest path between starting and ending nodes.
   d) a connected network with all directed potential links.

10. In critical path analysis CPM is

    a) event oriented   b) probabilistic in nature

    c) deterministic in nature   d) dynamic in nature

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(10 x 1 = 10 Marks)

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Part B

Answer **all** questions. Each question carries 2 marks.

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11. Write the standard form of the following L.P.P.

$$Min\ z = 2x_1 + x_2 + 4x_3 \text{, subject to}$$
$$-x_1 + 2x_2 + x_3 \le 15$$
$$x_1 + 4x_2 \ge 10$$
$$x_1 + 3x_3 \le 2$$
$$x_1, x_2 \ge 0 \text{ and } x_3 \text{ unrestricted sign.}$$

12. What is meant by degeneracy in L.P.P.?

13. Write the dual of the following L.P.P

$$Min\ z = 2x_1 + 3x_2 + 4x_3 \text{, subject to}$$
$$2x_1 + 3x_2 + 5x_3 \ge 2$$
$$x_1 + 4x_2 + 6x_3 \le 5$$
$$x_1, x_2 \ge 0 \text{ and } x_3 \text{ unrestricted sign.}$$

14. What are the factors affecting inventory control?

15. Distinguish between PERT and CPM.

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(5 x 2 = 10 Marks)

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Part C

Answer any **four** questions. Each question carries 5 marks.

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16. Explain the nature of Operations Research and its limitations.

17. Write the procedure for mathematical formulation of a linear programming problem.

18. Solve by Simplex method.

$$Max\ z = 7x_1 + 5x_2 \text{, subject to}$$
$$x_1 + 2x_2 \le 6$$
$$4x_1 + 3x_2 \le 12$$
$$x_1, x_2 \ge 0$$

19. Solve by big-M method.

$$Min\ z = 2x_1 + 3x_2 \text{, subject to}$$
$$x_1 + x_2 \ge 5$$
$$x_1 + 2x_2 \ge 6$$
$$x_1, x_2 \ge 0$$

<div align="center">(2)</div>

20. Explain Duality theory.

21. Find an IBFS to the following T.P. by Least Cost method.

11	13	17	14	250
16	18	14	10	300
21	24	13	10	400
200	225	275	250	

22. Explain Travelling Salesman Problem.

23. An animal feed company must produce 200lbs of a mixture containing the ingredients X_1 and X_2. X_1 costs Rs.3 per lbs and X_2 costs Rs.8 per lbs. Not more than 80 lbs of X_1 can be used and minimum quantity of X_2 to be used is 60 lbs. Find how much of each ingredient should be used, if the company wants to minimize the cost. Formulate.

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(4 x 5 = 20 Marks)

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Part D

Answer any **five** questions. Each question carries 8 marks.

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24. Use two-phase method to solve:

$$Max\ z = 5x_1 + 3x_2 \text{, subject to}$$
$$2x_1 + x_2 \le 1$$
$$x_1 + 4x_2 \ge 6$$
$$x_1, x_2 \ge 0$$

25. Use Dual simplex method to solve:

$$Min\ z = x_1 + x_2 \text{, subject to}$$
$$2x_1 + x_2 \ge 4$$
$$x_1 + 7x_2 \ge 7$$
$$x_1, x_2 \ge 0$$

26. Solve the following TP.

50	30	220	1
90	45	170	3
250	200	50	4
4	2	2	

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(3)   **Turn Over**

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