

15U309

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Name: .....

Reg. No.....

**THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2016**  
(CUCBCSS - UG)  
**CC15U BCA3 C06 - OPERATIONS RESEARCH**  
(Complementary Course)  
(2015 Admission)

Time: Three Hours

Maximum: 80 Marks

**Part A**

Answer **ALL** questions (Each carries 1 mark)

- 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)  $n + m$
- For maximisation LPP the simplex method is terminated when all the net evaluations are  
a)  $< 0$  b)  $0$  c)  $\geq 0$  d)  $\leq 0$
- 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
- The solution to a transportation problem with  $m$ - sources and  $n$ -destinations is feasible if the number of allocations are  
a)  $m + n$  b)  $m + n - 1$  c)  $m + n + 1$  d)  $mn$
- The method used for solving an assignment problem is called  
a) Modi method b) Vogel's approximation method c) Hungarian method d) none of the above
- The time period over which the inventory level will be controlled is called  
a) inventory turnover b) time horizon c) lead time d) none of the above
- An activity which doesn't consume either any resource or time is known as  
a) predecessor, b) successor c) dummy d) none of the above
- In PERT network each activity time assume a Beta- distribution because  
a) it need not be symmetrical about model value b) it has got finite non negative error c) it is a uni-modal distribution that provides information regarding the uncertainty of time estimates of activities. d) all the above
- VAM gives ..... to a TP  
a) an IBFS b) an optimal solution c) a degenerate solution d) none of the above
- The scientific method in OR consists of  
a) judgement phase b) research phase, c) action phase d) all the above

(10 × 1 = 10 marks)

**Part B**

Answer **ALL** questions (Each carries 2 marks)

11. Explain both standard and canonical forms of LPP.
12. Write the dual of the following LPP.

$$\begin{aligned} \text{Max } z &= 3x_1 + 17x_2 + 9x_3 \\ \text{Subject to } &x_1 - x_2 + x_3 \geq 3 \\ &-3x_1 + 2x_2 \leq 1 \\ &2x_1 + x_2 - 5x_3 = 1 \\ &x_1, x_2 \geq 0 \end{aligned}$$

13. Distinguish between PERT and CPM.
14. Write an unbalanced TP. Make it balanced.
15. What are the factors affecting inventory control?

(5 × 2 = 10 marks)

**Part C**

Answer **Any FIVE** questions (Each carry 5 marks)

16. Solve by simplex method.

$$\begin{aligned} \text{Max } z &= 7x_1 + 5x_2 \\ \text{Subject to } &x_1 + 2x_2 \leq 6 \\ &4x_1 + 3x_2 \leq 12 \\ &x_1, x_2 \geq 0 \end{aligned}$$

17. Solve by Big-M Method.

$$\begin{aligned} \text{Max } z &= 3x_1 - x_2 \\ \text{Subject to } &2x_1 + x_2 \leq 2 \\ &x_1 + 3x_2 \geq 3 \\ &x_2 \leq 4 \\ &x_1, x_2 \geq 0 \end{aligned}$$

18. Explain Travelling Salesman Problem.
19. Explain EOQ with price breaks.
20. Find an IBFS to the following TP by Least Cost method.

10	2	20	11
12	7	9	20
4	14	16	18

The supply and demands are 15, 25, 10 and 5, 15, 15, 15 respectively.

21. Describe a general maximal flow problem.
22. Construct PERT network for the following project schedule.

Activity	1-2	1-3	1-4	2-5	3-6	3-7	4-6	5-8	6-9	7-8	8-9
Time in weeks	2	2	1	4	8	5	3	1	5	4	3

23. What are the advantages and limitations of O.R models?

(5 × 5 = 25 marks)

**Part D**

Answer **Any FIVE** questions (Each carry 8 marks)

24. Explain two-phase method to solve an LPP having artificial variables.

25. Using dual simplex method solve

$$\begin{aligned} \text{Min } z &= 3x_1 + 2x_2 \\ \text{Subject to } 3x_1 + x_2 &\geq 3 \\ 4x_1 + 3x_2 &\geq 6 \\ x_1 + x_2 &\leq 3 \\ x_1, x_2 &\geq 0 \end{aligned}$$

26. Solve the following assignment problem.

	A	B	C	D	E
1	32	38	40	28	40
2	40	24	28	21	36
3	41	27	33	30	37
4	22	38	41	36	36
5	29	33	40	35	39

27. Solve the following TP. The supply and demands are 70, 55, 90 and 85,35,50,45 respectively

6	1	9	3
11	5	2	8
10	12	4	7

28. Derive the formula for EOQ for the manufacturing inventory model without shortage.

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

Activity	A	B	C	D	E	F	G	H	I	J
Predecessor	-	-	A	B	C,D	C,D	E	E	F,G	H,I
Estimated time in weeks	4	6	9	7	5	4	3	6	9	4

30. What is a replacement problem? When does it arise? Describe various types of replacement situations and decisions with suitable examples.

31. Explain various basic steps in PERT/CPM techniques. Why is CPM/PERT a popular and widely applied management science technique? Discuss.

(5 × 8 = 40 marks)

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