D 31126 **(Pages : 4)** **Name..**

Reg. No ....

THIRD SEMESTER B.C.A. DEGREE EXAMINATION, NOVEMBER 2012

(CCSS)

CA 3C 06—OPERATIONS RESEARCH

Time : Three Hours **Maximum : 30 Weightage**

I. Answer all *twelve* questions

1 Any solution of LPP which satisfies the non-negativity constraint is called __________

2 The maximization problem in the primal become the __________ problem in dual.

3 If a constant value is added to every cost element cy in the transportation problem, the optimal value of the variables xy will change. Is it true ?

4 If the cost matrix of a given assignment problem is not a square matrix, then the problem is __________

5 In a traveling salesman problem, the salesman can visit a city twice, until he has visited all the cities once—Is it true or false.

6 The time between starting the first job and completing the last job which also include the ideal time is __________

7 What is the name of the activity whose total float is zero.

8 The time period over which the inventory level will be controlled is known as __________

9 The optimum order quantity decreases with increase in __________

10 If all the items are replaced irrespective of whether they have failed or not is known as __________ policy.

11 The ordering cost is independent of __________

12 The time period between placement of two successive orders is referred to as __________

(12 x = 3 weightage)

II. Answer *all* questions :

13 Convert the following LPP into standard form :

Minimize $Z = 3x_1 + 2x_2$

subjected to $4x_1 + 3x_2 \quad 12$

$4x_1 + x_2 \geq 2$

$x1, x_2 \geq 0.$

14 What is pesudo-optimal solution.

Turn over

15 Write the dual of the following LPP

Maximize $Z = 3x_1 - x_2 + x_3$

subjected to $4x_1 - x_2$ S 8

$8x_1 + 4x_2 + x_3 \geq 2$

, x_2 >_0.

16 Define basic solution and optimal basic feasible solution.

17 Obtain an initial basic solution for the following transportation problem using least cost method.

18 Determine an initial basic feasible solution for the following transportation problem using least cost method

From	I	50	30	220	1	
	II	90	45	170	3	Availability
	III	250	200	50	4	
		4				

19 Solve the following minimal assignment problem :

		Men 1	2	3	4
Job	I	12	30	21.	15
	II	18	33	9	31
	III	44	25	24	21
	IV	23	30	28	14

20 The annual demand for a product is 1,00,000 units. The rate of production is 2,00,000 units per year. The set-up cost per production run is Rs. 5,000 and the variable product cost of each item is Rs. 10. The annual holding cost per unit is 20% of its value. Find the optimum production for size and the length of the production run.

21 Draw a network and determine the critical path :

Job :	1-2	1-3	2-4	3-4	3-5	4-5	4-6	5-6
Duration :	6	5	10	3	4	6	2	9

Draw a network and find the critical path.

(9 x 1 = 9 weightage)

III. Answer any *five* questions :

22 A resourceful home decorator manufactures 2 types of lamps say A and B. Both lamps go through two technicians first a cutter and second finisher. Lamp A requires two hours of cutter's time and one hour of the finisher's time. Lamp B requires one hour of cutter's time and two hours of finishers time. The cutter has 104 hours and finisher has 76 hours of available time each month. Profit on 1 lamp A is Rs. 6 and on one lamp B is R. 11. Formula a mathematical model, to the problem.

23 Solve by simplex method ;

Maximize $Z = 7x_1 + 5x_2$

subjected to $x_1 + 2x_2 \quad 6$

$4x_1 + 3x_2 \quad 12$

$x_1, x_2 \geq 0.$

24 Solve the Transportation problem by Vogal Approximation Method

	1	2	3	4	
	1	2	3	4	6
2	4	3	2	0	8
3	0	2	2	1	10
	4	6	8	6	

25 The probability P_n of failure just before age n is shown below. An individual replacement cost Rs. 12.5 and group replacement costs Rs. 3 per item. Find the optimal replacement policy

n	1	2	3	4	5
p_n	0.1	0.2	0.25	0.3	0.15

26 The following table shows the jobs of a network along with their time estimates. The time estimates are in days.

Job	1-2	1-6	2-3	2-4	3-5	4-5	5-8	6-7	7-8
a	3	2	6	2	5	3	1	3	4
m	6	5	12	5	11	6	4	9	19
b	15	14	30	8	17	15	7	27	28

27 A conductor has to supply 20,000 unit per day. He can produce 30,000 units / day. The cost of holding a unit is stock is Rs. 3 per year and the set-up cost per run is Rs. 50. How frequently and of what size should the production run be made.

28 Draw a network and determine the critical path :

Job	1-2	1—3	2-4	3-4	3-5	4-5	4-6	5-6
Duration	6	5	10	2	4	6	2	9

(5 x 2 = 10 weightage)

N. Answer any *two* questions :

29 Use penalty method (Big μ method) solve the following LPP :

Maximize $Z = 2x_1 + x_2 + 3x_3$

subjected to $x_1 + X_2 + 2x_3$ 5- 5

$2x_1 + 3x_2 + 4x_3 = 12$

x_i, x_2, x_3 O.

30 A machine operator has to perform three operations turning, threading and knurling on a number of different jobs. The time required to perform these operations (in minutes) of each job is known. Determine the order in which the jobs should be processed in order to minimize the total time required to turn out all the jobs.

Job	1	2	3	4	5	6
Turning	3	12	5	2	9	11
Threading	8	6	4	6	3	1
Knurling	13	14	9	12	8	13.

31 Solve the transportation problem :

Destination

		A	B	C	D	Supply
Source	1	11	20	7	8	50
	2	21	16	20	12	40
	3	8	12	8	9	70
Demand		30	25	35	40	

(2 x 4 = 8 weightage)