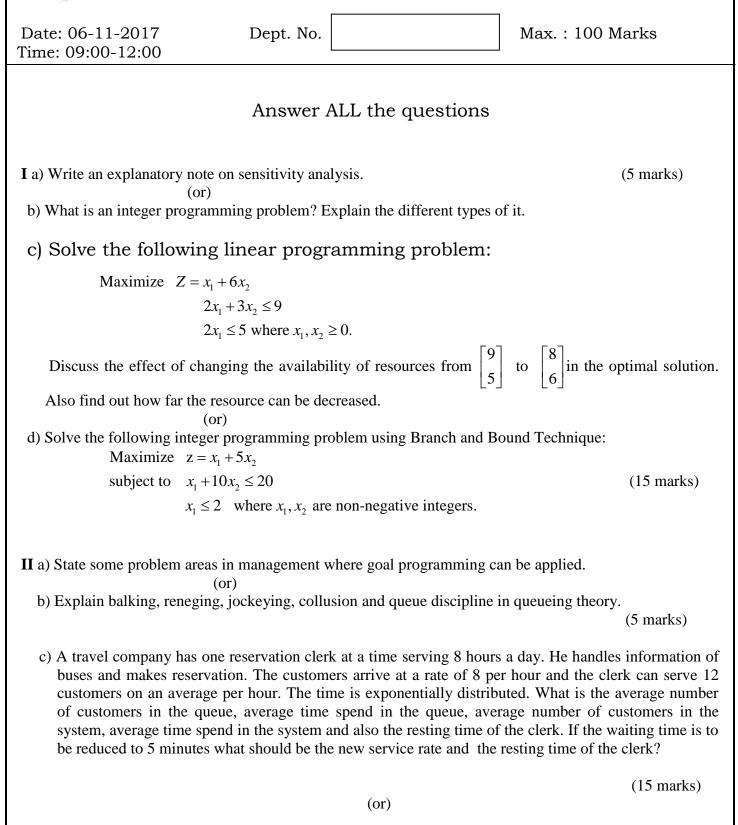
## LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – MATHEMATICS

THIRD SEMESTER – NOVEMBER 2017

**16PMT3MC03 - OPERATIONS RESEARCH** 



d) Following information is known about a group of items kept in inventory of a company. Perform ABC analysis and explain with graphical representation.

Items	Units	Unit cost in Rs.
1	48,000	5
2	2,000	11
3	300	15
4	800	8
5	4,800	7
6	1200	16
7	18,000	20
8	300	4
9	5,000	9
10	500	12

III a) What is a replacement problem? Describe some replacement situations with examples.

(5 marks)

(or)

- b) Explain with example the different failure mechanism of items.
- c) (i) Explain individual and group replacement policies with example.

(ii) The cost of a machine is Rs.6100 and its scrap value is only Rs.100. The maintenance costs are found from experience to be as follows:

Year	1	2	3	4	5	6	7	8
Maintenance cost in Rs.	100	250	400	600	900	1250	1600	2000
When should be the maching		(5+10 marks)						

(or)

d) Machine A costs Rs.9000. Annual operating cost is Rs.200 for the first year and then increases by Rs.2000 every year and in the fourth year the operating cost becomes Rs.6200. Determine the best age at which the machine to be replaced? Machine B costs Rs.10000. Annual operating cost is Rs.400 for the first year and then increases by Rs.800 every year and in the sixth year the operating cost becomes Rs.4400. For both the machines there is no scrap value. Which machine will you prefer? Give reason.

IV a) Explain dynamic programming problem. How is it useful in business?

(or)

- b) Mention some of the applications of dynamic programming? (5 marks)
- c) (i) Mention the salient features of dynamic programming technique. (5+10 marks)
  - (ii) A salesman decided to travel from city 1 to city 10 so that the total cost becomes minimum. Find the least cost route for the salesman from city 1 to city 10 using dynamic programming technique.

				city	5	6	7	city	8	9	city	10
city	2	3	4	2	70	40	60	5	10	40	cuy o	10 30 40
1	20	40	30	3	30	20	40	6	60	30	8	30
				4	40	10	50	7	30	30	9	40

d) Six units of capital can be invested in three activities with return from each activity given in the following table. Find the allocation of capital to each activity that will maximize the total return.

Unit	Activity 1	Activity 2	Activity 3
0	0	0	0
1	25	20	33
2	42	38	43
3	55	54	47
4	63	65	50
5	69	73	52
6	74	80	53

- V a) Mention any four models in quadratic programming problem and explain the method of solving the model without any constraint. (5 marks) (or)
  - b) State Kuhn-Tucker conditions to solve quadratic programming problem.
  - c) Using Kuhn-Tucker conditions solve the non-linear programming problem:

Minimize  $z = 5x_1^2 - x_2$ subject to  $x_1 + x_2 = 8$  $x_1^2 + 3x_2^2 \le 5$  $x_1 \ge 2$  where  $x_1, x_2 \ge 0$ .

(or)

d) Determine the maxima or minima of the function  $f = x^2 + 2y^2 + z^2 + xy + z$  subject to the constraint x + y + z = 30 at x, y, z using Lagrangian Multiplier Methods.

(15 marks)

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