Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/B.TECH(ME)/SEP.SUPPLE/SEM-7/ME-703/2012

2012

OPERATION RESEARCH & INDUSTRIAL MANAGEMENT

Time Allotted : 3 Hours *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Graph sheet(s) will be provided by the Institute on demand.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

   i) Marketing activities are related to

      a) making more profit

      b) earn more revenue

      c) earn customer's satisfaction

      d) none of these.

   ii) Break-even analysis is done for finding out

      a) profit zone

      b) loss making zone

      c) no profit no loss points

      d) all of these.

iii) Factory organization controls the

a) design and development of new products

b) marketing of products

c) utilisation of man and machine

d) none of these.

iv) In PERT the span of time between the optimistic and pessimistic time estimates of an activity is

a) 3σ b) 6σ

c) 12σ d) none of these.

v) The solution to a transportation problem with m-rows and n-columns is feasible if number of positive allocation is

a) $m + n$ b) $m \times n$

c) $m + n - 1$ d) $m + n + 1$.

vi) CPM has which of the following time estimates ?

a) One-time estimate b) Two-time estimate

c) Three-time estimate d) Four-time estimate

d) Nil time estimate.

vii) VED analysis is applied for determining

a) slow moving items b) high value items

c) critical items d) none of these.

viii) In a game theory problem if the payoff matrix is formed in favour of player *A* (all the elements of the matrix will be profit of *A*), then he should follow

a) max-max principle b) min-max principle

c) max-min principle d) min-min principle.

ix) The assignment matrix is always is a/an

a) rectangular matrix b) square matrix

c) identity matrix d) none of these.

x) Depreciation of machine is categorized under the head of

a) direct expenses

b) indirect expenses

c) administrative expenses

d) indirect material cost.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. State the difference between product layout and process layout.

3. Graphically maximize, Z given by

$Z = 2x_1 + 3x_2$

subject to, $x_1 + x_2 \leq 30$

when, $12 \geq x_2 \geq 3$

$x_1 - x_2 \geq 0$

when $x_1 \leq 20$

$x_1, x_2 \geq 0$.

4. Explain the necessity of market research in a 'Modern Industry'.

5. The rate of use of particular raw material from stores is 20 units per year. The cost of placing and receiving an order is Rs. 40. The cost of each unit is Rs. 100. The cost of carrying inventory in per cent per year is 0·16 and it depends upon the average stock. Determine the economic order quantity.

6. A company manufactures two products *X* and *Y*. The profit contribution of *X* and *Y* are Rs. 3 and Rs. 4 respectively. The products *X* and *Y* require the services of four facilities. The capacities of four facilities *A, B, C* and *D* are limited and the available capacities in hours are 200 hrs, 150 hrs, 100 hrs and 80 hrs respectively. Product *X* requires 5, 3, 5 and 8 hours of facilities *A, B, C* and *D* respectively. Similarly the requirements of products *Y* are 4, 5, 5 and 4 hours respectively on *A, B, C* and *D*. Find the optimal product mix to maximize the profit. Use graphical method.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) What is Monte-Carlo simulation ? Discuss various steps involved in Monte-Carlo simulation. State the areas of applications of this type of simulation.

b) A confectioner sells the confectionery items. Part data of demand per week in hundred kilograms with frequency is as given below :

Demand/week :	0	5	10	15	20	25
Frequency :	2	11	8	21	5	3

Using the following sequence of random numbers generate the demand for next 15 weeks. Also find out the average demand per week. Use the random numbers :

35, 52, 90, 13, 23, 73, 34, 57, 35, 83, 94, 56, 67, 66 and 60.

8. a) State the advantages of man-power planning in an organization.

b) A company has factories at *A, B, C* which supply warehouses at *M, N, P, Q*. Monthly factory capacities are 70, 90 & 115 respectively. Unit shipping costs are as follows :

From	To			
	M	*N*	*P*	*Q*
A	17	20	13	12
B	15	21	26	25
C	15	14	15	17

Determine the optimum distribution for this company to minimize shipping cost. 7 + 8

9. a) The table below lists all the activities which together constitute a small engineering project. Calculate the total project duration.

Activity	1-2	1-3	1-4	2-5	3-4	4-5	4-6	5-6	5-7	6-7	3-7
Activity Duration	20	23	8	19	16	0	18	0	4	10	24

b) Differentiate between PERT and CPM. 10 + 5

10. a) Briefly describe *ABC* analysis.

b) Write note on Bin Card.

c) What are the functions of purchase department ?

d) Explain the difference between marketing and selling.

3 + 5 + 3 + 4

11. a) How can you determine the standard cost of product ? How standard costing is helpful in budgeting concept ? Name the various types of budgets. Analyze the importance of budgetary control in improving company's performance.

b) In a departmental store one cashier is there to serve the customers. And the customers pick up their needs by themselves. The arrival rate is 9 customers for every 5 minutes and the cashier can serve 10 customers in 5 minutes. Assuming Poisson arrival rate and exponential distribution for service rate, find

i) Average number of customers in the system

ii) Average number of customers in the queue or average queue length

iii) Average time a customer spends in the system

iv) Average time a customer waits before being served.

7 + 8

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