Name : ……………………………………………………

Roll No. : ……………………………………………………

Invigilator's Signature : ………………………………………

CS/B.Tech (AUE-NEW)/SEM-6/AUE-606/2013
2013
PRODUCTION MANAGEMENT & OPERATION RESEARCH

Time Allotted : 3 Hours   *Full Marks :* 70

The figures in the margin indicate full marks.

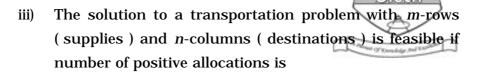*Candidates are required to give their answers in their own words as far as practicable.*

GROUP – A
(Multiple Choice Type Questions)

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

   i)   The dual of the dual of an LPP is the

   a)   primal   b)   dual

   c)   both primal and dual   d)   none of these.

   ii)   A feasible solution to an LP problem

   a)   must satisfy all of the problem's constraints simultaneously

   b)   need not satisfy all of the constraints, only some of them

   c)   must be a corner point of the feasible region

   d)   must optimize the value of the objective function.

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iii) The solution to a transportation problem with m-rows (supplies) and n-columns (destinations) is feasible if number of positive allocations is

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

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

iv) An assignment problem is a special type of

    a)   transportation problem

    b)   LPP

    c)   inventory problem

    d)   none of these.
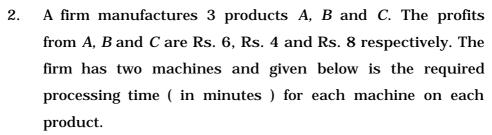
v) The objective of network analysis is to

    a)   minimize total project duration

    b)   minimize total project cost

    c)   minimize production delays

    d)   all of these.

vi) Which model is used for productivity measurement ?

    a)   EOQ model

    b)   Craig and Harris model

    c)   EPQ model

    d)   All of these.

vii) A job is just on schedule and needs close monitoring, if the value of critical ratio is

a) > 1

b) < 1

c) = 1

d) none of these.

viii) The concept of product structure is used in

a) MRR

b) CPM

c) PERT

d) Queuing models.

ix) Manufacturing of daily used commodities are example of

a) batch production

b) mass production

c) job production

d) none of these.

x) Close loop MRP means

a) MRP II

b) MPS

c) JIT

d) PSR.

　　　　　　　　　　3　　　　　　　　　　[Turn over

GROUP – B
(Short Answer Type Questions)
Answer any *three* of the following.   3 × 5 = 15

2. A firm manufactures 3 products *A*, *B* and *C*. The profits from *A*, *B* and *C* are Rs. 6, Rs. 4 and Rs. 8 respectively. The firm has two machines and given below is the required processing time (in minutes) for each machine on each product.

Machine	*Product*		
	A	*B*	*C*
X	8	6	10
Y	4	4	8

Machine *X* and *Y* have 4000 and 5000 machine minutes respectively. The firm must manufacture 200 *A*'s, 400 *B*'s and 100 *C*'s but not more than 300 *A*'s. Set up a LP problem to maximize profit.

3. Find the initial basic feasible solution of the following transportation problem by Vogel's Approximation Method (VAM) :

Warehouses Plants	W1	W2	W3	W4	Capacity
F1	10	30	50	10	7
F2	70	30	40	60	9
F3	40	8	70	20	18
Requirement	5	8	7	14	34 34

4. Explain the meaning of crashing in network techniques.

5. Discuss about different product development phases with proper examples.

6. Explain different functions of production, planning and control department.

GROUP – C
(Long Answer Type Questions)
Answer any *three* of the following.   3 × 15 = 45

7. Four different jobs can be done on four different machines. The set-up and take-down time costs are assumed to be prohibitively high for changeovers. The matrix below gives the cost in rupees of producing job *I* on machine *J*.

	M1	M2	M3	M4
J1	5	7	11	6
J2	8	5	9	9
J3	4	7	10	7
J4	10	4	8	3

How should the jobs be assigned to the various machines so that the total cost is minimized ?

8. Draw CPM network for following project. Then determine critical path and minimum project time. Also calculate earliest and latest occurrence times for each event. Make out float analysis for the non-critical activities :

Activities	A	B	C	D	E	F	G	H	I
Predecessor	–	–	A	A	A	E	D,F	B,C	G,H
Active time	5	6	4	3	1	4	14	12	2

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9. Write short notes on any *three* of the following : 3 × 5

   a) Limitations of LP models

   b) Maximin principle of game theory

   c) Assignment model as a special class of transportation model

   d) Various productivity indices.

10. a) Nine jobs are performed first on machine M1 and then on machine M2. Time in hours taken by each job on each machine is given below. Find the sequence that minimizes the total elapsed time required to complete the jobs on the two machines.

Jobs	A	B	C	D	E	F	G	H	I
M1	2	5	4	9	6	8	7	5	4
M2	6	8	7	4	3	9	3	8	11

   b) What is the different selective inventory control techniques associated with inventory management ? Explain any of them.

   c) What do you mean by Economic Order Quantity (EOQ) ? Derive the equation of EOQ for a company with constant demand rate, instantaneous supply, fixed lead time and no shortages allowed. 5 + 5 + 5

11. a) What do you mean by Cobb-Douglas production function ? What is productivity ? How is it related to production ?

b) Explain Kendrick and Creamer's productivity measurement model.

c) Consider the *ABC* Company. The data for output produced and inputs consumed for a particular time period are given below :

Output = Rs. 1000

Human input = Rs. 300

Material input = Rs. 200

Capital input = Rs. 300

Energy input = Rs. 100

Other expense input = Rs. 50

It is assumed that these values are in constant rupees with respect to a base period. Then find the partial, total factor and total productivity values for this company.