MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

Paper Code : AUE-606(HU)

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.

Graph sheet(s) will be supplied by the Institution.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

$$10 \times 1 = 10$$

i) A constraint in an LP model restricts

   a) Value of objective function

   b) Value of a decision variable

   c) Use of the available resources

   d) All of these.

ii) The method used for solving an assignment problem is called

   a) Reduced matrix method

   b) MODI method

   c) Hungarian method

   d) None of these.

iii) 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.

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

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

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

v) Generally PERT technique deals with the project of

   a) Repetitive nature

   b) Non-repetitive nature

   c) Deterministic nature

   d) None of these.

vi) Who developed the EOQ model ?

   a) Walter Schewhart   b) F.W. Taylor

   c) F.W. Harris   d) Henry Ford.

vii) Gantt chart is used for

   a) Inventory control

   b) Material handling

   c) Production schedule

   d) All of these.

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viii) Manufacturing of daily used commodities are example of

a) Batch production   b) Mass production

c) Job production   d) None of these.

ix) Queuing theory deals with problems of

a) Material Handling

b) Reducing the waiting time or idle time

c) Better utilization of man service

d) None of these.

x) Closed loop MRP means

a) MRP II   b) MPS

c) JIT   d) PSR.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. A company produces three products A, B and C using three machines X, Y and Z. The following table provides the data for the problem.

Machines	Products			Available machine Hrs.
	A	B	C	
X	10	2	1	100
Y	7	3	2	77
Z	2	4	1	80
Profit/unit	12	3	1	

Formulate an LP model that determines the optimum product mix for the company to maximize the profit

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3. Find out the initial basic feasible solution and the corresponding transportation cost of the following transportation problem using VAM.

Source \ Destination	1	2	3	4	Supply
1	10	2	20	11	15
2	12	7	9	20	25
3	4	14	16	18	10
Demand	5	15	15	15	50 / 50

4. Explain the meaning of crashing in network techniques.

5. If the annual demand of an item becomes half, ordering cost double, holding cost one-fourth and the unit cost twice, then what will be the ratio of the new EOQ and the earlier EOQ ?

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

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

7. The Reddy Mikks Company produces both interior and exterior paints from two raw materials, M1 and M2. The following table provides the basic data of the problem :

Raw materials	Tons of raw material per ton of		Maximum daily availability (tons)
	Exterior paint	Interior paint	
M1	6	4	24
M2	1	2	6
Profit per ton ($1000)	5	4	

A market survey restricts the daily demand of interior paint to 2 tons. Additionally, the daily demand of interior paint cannot exceed that of exterior paint by more than 1 ton. Determine the optimum product mix of interior and exterior paints for The Reddy Mikks Company that maximizes the total daily profit. Solve the problem graphically.

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 out make 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
Activity time	5	6	4	3	1	4	14	12	2

4 + 3 + 8

9. a) Consider a self service store with one cashier. Assume Poisson arrival and exponentials service times. Suppose that 9 customers arrive on the average every 5 minutes and the cashier can serve 10 in 5 minutes. Find

   i) The average number of customer queuing for service.

   ii) The probability having more than 10 customers in the system.

   iii) The probability that a customer has to queue for more than 2 minutes.

   b) Purchase manager places order each time for a lot of 500 no. of particular item from the available data the following results are obtained : inventory carrying = 40%, ordering cost for order = Rs. 600, Cost per unit = Rs. 50, Annual demand = 1000.

   Find out the loss to the organizations due to his ordering policy.

10. Write short notes on any *three* of the following :

   $3 \times 5 = 15$

   a) Limitations of LP models.

   b) n person zero sum game.

   c) Types of production systems according to product volume and variety

   d) ABC analysis

   e) Productivity indices.

11. Four different jobs can be done on four different machines. The setup and take down time cost are assumed to be prohibitively high for changeovers. The

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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 ?