



Name :

Roll No. :

Invigilator's Signature :

**CS/B.Tech (APM)/SEM-6/APM-605/2010
2010
OPERATIONS 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 : $5 \times 2 = 10$
- i) Linear programming is
 - a) a constrained optimization model
 - b) a constrained decision making model
 - c) a mathematical programming model
 - d) all of these
 - e) none of these.
 - ii) Every corner of the feasible region is defined by
 - a) the intersections of 2 constraint lines
 - b) some subset of constraint lines and non-negativity conditions
 - c) all of these
 - d) none of these.



iii) The signal for optimality in a max. model is

- a) $C_j - Z_j \leq 0 \forall j$
- b) $Z_j \leq 0 \forall j$
- c) $C_j - Z_j \geq 0 \forall j$.

iv) The non-negativity requirement is included in an LP because

- a) it makes the model easier to solve
- b) it makes the model correspond more closely to the real world problem
- c) both (a) and (b)
- d) neither of these.

v) The simplex method has the property that

- a) at each iteration it gives a solution which is at least as good as the earlier solution
- b) at each stage it produces feasible solution
- c) it signals that optimal solution has been found
- d) none of these.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.

3 × 5 = 15

2. What is Economic order quantity for inventory management ? Discuss its importance in inventory management of Apparel industry.
3. What is saddle point ? Explain in with example. How is saddle point determined by different approaches of Game theory ?
4. Explain the terms “slack variables”, “basic solutions” and “basic feasible solutions”.
5. Solve the following linear programming problem graphically :

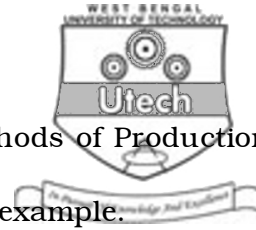
$$\text{Maximize } Z = 4x_1 + 6x_2$$

$$\text{subject to the constraints } x_1 + x_2 = 5$$

$$x_1 \geq 2, x_2 \leq 4$$

$$x_1, x_2 \geq 0.$$

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6. What do you mean by CPM & PERT methods of Production planning and scheduling? Explain it with example.
7. Mention the activity dependency conditions against the following CPM diagram as shown below :

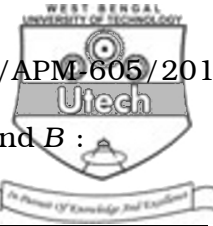
Fig.

GROUP – C

(Long Answer Type Questions)

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

8. A diet for a sick person must contain at least 4,000 units of vitamins, 50 units of minerals and 1,400 unit of calories. Two foods A & B are available at a cost of Rs. 4 and Rs. 3 per unit respectively. If one unit of A contains 200 units of vitamins, 1 unit of mineral & 40 units of calories and 1 unit of food B contains 100 units of vitamins, 2 units of minerals and 40 units of calories, find by simplex method, what combination of food be used to have least cost ?



9. Following is the pay-off matrix for players A and B :

		Player B				
		I	II	III	IV	V
Player A	I	2	4	3	8	4
	II	5	6	3	7	8
	III	6	7	9	8	7
	IV	4	2	8	4	3

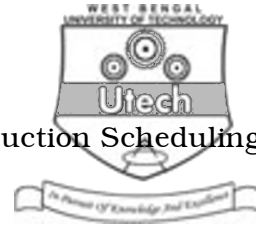
Using dominance property, obtain the optimal strategies for both the players and determine the value of the game.

10. Solve the following game graphically & find the value of the game.

		Player B		
		B_1	B_2	B_3
A_1	$\left[\begin{array}{ccc} 8 & 4 & -2 \end{array} \right]$			
A_3	$\left[\begin{array}{ccc} -2 & -1 & 3 \end{array} \right]$			

11. Discuss briefly the applications of linear programming in any functional area of management. Give an explanation of non-feasible solution and the degeneracy.

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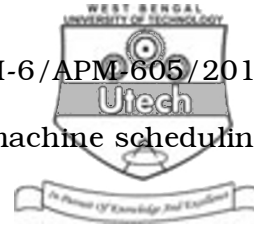
12. According to the Work Break Down & Production Scheduling, the following table has been formed :

Activity	Must precede	Estimated Time required (in days)
A	None	2
B	A	3
C	A	3
D	C	4
E	C	5
F	E	2
G	E	2

- Prepare a suitable CPM diagram.
- Prepare a suitable PERT diagram.
- Identify the critical path & time required for project completion.

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

- Optimization of production cost by linear programming approach.
- ABC analysis and VED analysis of inventory items.
- Mixed strategy approach of Game theory.



- d) Production planning and control by machine scheduling as per product mix.
- e) Quantitative approaches for decision making for cost reduction in production process.
- f) Methods of review project performance analysis.
- g) Techniques/measures of reduction of idle machine hours and man-hours.
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