MTH601 Operations Research

Mid Term Examination - November 2004

Time Allowed: 90 Minutes

Instructions

Please read the following instructions carefully before attempting any of the questions:

1. Attempt all questions. Marks are written adjacent to each question.
2. Do not ask any questions about the contents of this examination from anyone.

a. If you think that there is something wrong with any of the questions, attempt it to the best of your understanding.

b. If you believe that some essential piece of information is missing, make an appropriate assumption and use it to solve the problem.

c. Write all steps, missing steps may lead to deduction of marks.

3. In Q3 you can either draw the network diagram or simply write the asked terms for each activity in the exam software, whichever you think is easy for you. But remember that you have to show your work on exam application correspond to each question.

****WARNING: Please note that Virtual University takes serious note of unfair means. Anyone found involved in cheating will get an `F` grade in this course.**

Total Marks: 30 **Total**
Questions: 3

Question No. 1 **Marks : 10**

A small plant makes two types of automobile parts Part A and Part B. It buys castings that are machined, bored and polished. You are given the following data.

Capacity	Part A	Part B
Machining Capacity	25/hr	40/hr
Boring Capacity	28/hr	35/hr
Polishing Capacity	35/hr	25/hr

Castings for Part A cost Rs. 20/- each and for Part B they cost Rs. 30/- each. They sell for Rs. 50/- and Rs.60/- respectively. The three machines have running costs of Rs. 200/-, Rs.140/- and Rs. 175/- per hour. Assuming that any combination of Part A and B can be sold. Formulate a linear programming model.

Or

Solve the following problem using simplex method:

Maximize $Z = 9x_1 + 8x_2 + 7x_3$

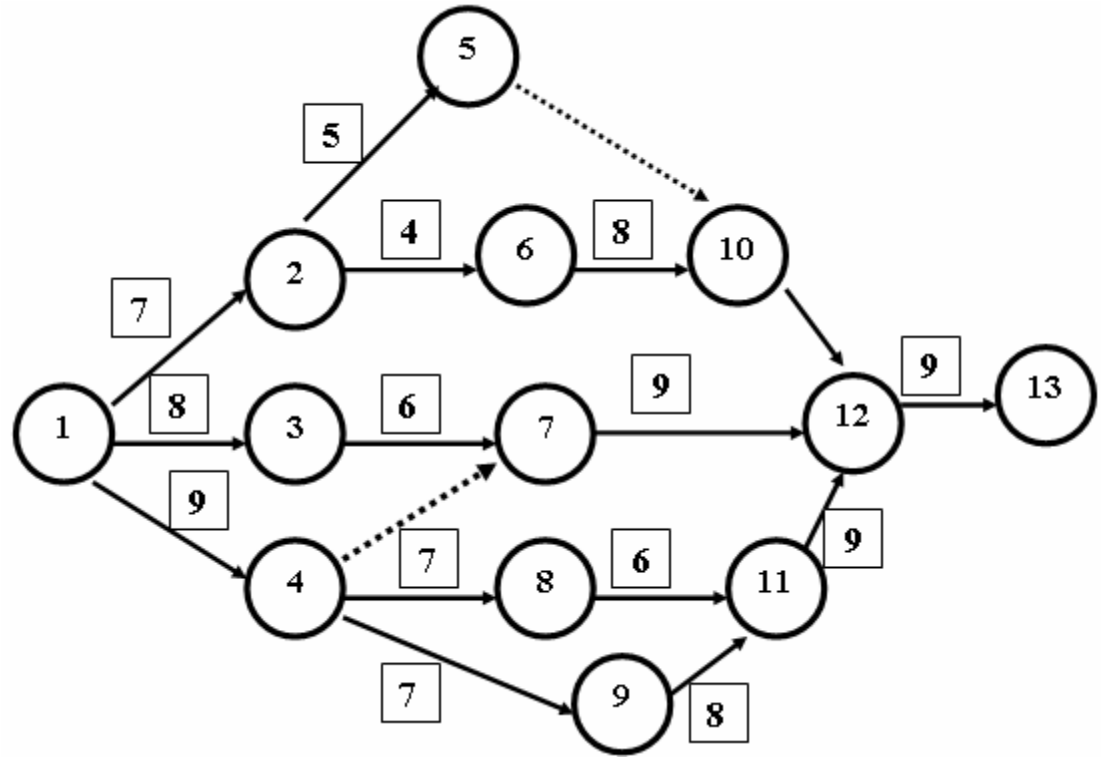
Subject to

$$2x_1 + x_2 + 2x_3 \leq 50$$
$$x_1 + 3x_2 + x_3 \leq 25$$
$$x_1 + 2x_2 + x_3 \leq 26$$
$$x_1, \quad x_2, \quad x_3 \geq 0$$

Question No. 2 **Marks : 10**

Consider the following Network, figures in the boxes are the durations. Determine

(a) The earliest expected completion time for each period,
(b) The latest allowable event completion time for each event
(c) The slack time (all floats) for each event
(d) The Critical Path through the Network



Question No. 3 **Marks : 10**

The demand for a purchased item is 2000 units per month and the shortages are allowed. If the unit cost is Rs 20 per unit, the cost of making one purchase is Rs 1000, the holding cost for 1 unit is Rs 20 per year and the cost of one shortage is Rs 500 per year, determine:

(a) The economic purchase quantity.
(b) The time between orders.
(c) The number of orders per year.
(d) The optimum shortages.
(e) The maximum inventory.
(f) The time of items being held.
(g) The optimum annual cost.

Or

A company produces 36000 units per year and the demand of the product is 2400 items per year. The unit cost is Rs 10 per item, the holding cost is one rupee per month per item and the set up cost is Rs 100, determine the following if no shortages are allowed

(a) Optimum manufacture quantity
(b) The maximum inventory
(c) The time between setups
(d) The number of setups
(e) The manufacturing time
(f) The total optimum annual cost