MTH601 - Operations Research - Final Term Paper

Fall 2005 – session 6

http://www.vuzs.net/study-portals/bscs-study-portal.html

Time Allowed: 150 Minutes

Total Marks: 50 Total Questions: 17

MTH601 - Operations Research - Q. No. 1 M - 01

Minimizing $Z = \sum_{i=1}^{n} c_i x_i$ is equivalent to

-
-
-
- None of the above

MTH601 - Operations Research - Q. No. 2 M - 01

According to_____ strategy, replace an item if it fails before the optimum period 'P'

- IR
- IPR
- CPR (Common Preventive Replacement)

MTH601 - Operations Research - Q. No. 3 M – 03

A manufacturer has distribution centers at X, Y and Z. These centers have availability of 45, 20 and 30 units of the product, His retail outlets at A, B, C, D and E require 25, 10, 20, 30 and 15 units respectively. The transportation cost per unit between each centre and each outlet is given in the table below.

Distribution Centers	Retail Outlets				
	A	B	C	D	E
X	50	30	40	50	50
Y	35	30	100	45	60
Z	40	60	85	35	30

Is this model balanced? If "NO" balance the above Transportation model.

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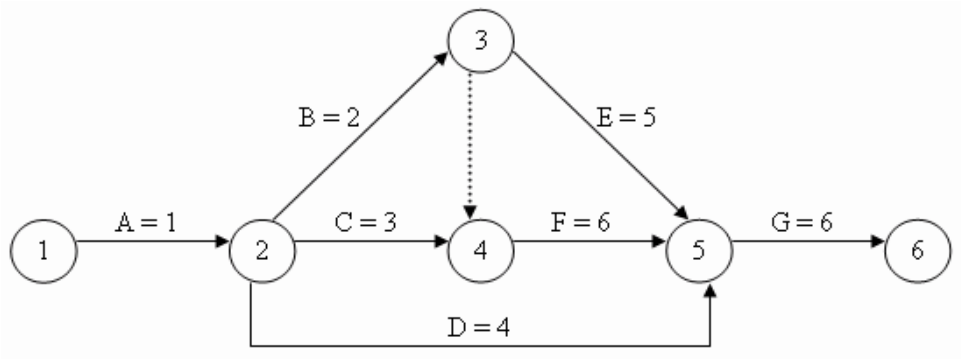
MTH601 - Operations Research - Q. No. 4 M – 05

Compute Latest start time (LST) and Latest Finish Time LFT for each activity of the following network, if the project is to be completed by the deadline of day 16.



MTH601 - Operations Research - Q. No. 5 M - 01
In purchasing model with shortage, the formula of Ordering Size is

MTH601 - Operations Research - Q. No. 6 M - 01
Similarity between CPM and PERT is

- Both are used to plan the scheduling of individual activities that make up a project
- Both can be used to determine the earliest/latest stat and finish time for each activity
- All of the above

MTH601 - Operations Research - Q. No. 7 M - 05

The arrival rate of customers at a banking counter follows Poisson distribution with a mean of 45 customers per hour. The service rate of the counter clerk also follows Poisson distribution with a mean of 60 customers per hour.
Find the following
1. The probability of having 10 customers in the system
2. Average number of customers waiting in the system
3. Average number of customers waiting in the queue
4. Average waiting time of customers in the system
5. Average waiting time of customers in the queue

MTH601 - Operations Research - Q. No. 8 M - 01
The formula for expected number of customers in a system is

- $L = \lambda /(\mu - \lambda)$
- $L = \lambda /(\lambda - \mu)$ **o** $L = \mu /(\lambda - \mu)$ **o** $L = \mu /(\mu - \lambda)$

MTH601 - Operations Research - Q. No. 9 M - 01
For LP problem with '*n*' decision variables, each of its corner point solution is at the intersection of constraint boundaries.

- $(n - 1)$ constraint boundaries
- *'n'* constraint boundaries
- $(n + 1)$ constraint boundaries
- None of the above

MTH601 - Operations Research - Q. No. 10 M - 01

In two dimensional LP problem we need only two lines to identify an extreme point. If in any two dimensional problem there are three or more intersecting lines at the corner point then this indicate that

- Problem has Degenerate Solution
- One of the constraints is redundant
- Both First and Second
- None of the above

MTH601 - Operations Research - Q. No. 11 M – 10

Consider the following LP problem
Minimize Z= 12 x1 + 18 x2 + 15 x3
Subject to

$4\ x1 + 8\ x2 + 6\ x3 \geq 64$
$3\ x1 + 6\ x2 + 12\ x3 \geq 96$
$x1\ ,\ x2\ ,\ x3 \geq 0$

(a). write the associated Dual Problem of the above Primal Problem
(b). The optimal table for phase-I of the above model is given below

Basic	x_1	x_2	x_3	s_1	s_2	R_1	R_2	R.H.S
Z	0	0	0	0	0	0	1	1
x_2	1/2	1	0	-1/5	1/10	1/5	-1/10	16/5
x_3	0	0	1	1/10	-2/15	-1/10	2/15	32/5

Using this above table find the Optimal Solution for Phase-II

MTH601 - Operations Research - Q. No. 12 M - 01

A transportation problem is degenerate, if while deriving a feasible solution an allocation to any cell

- Satisfies the Column requirements
- Satisfies the Row requirements
- Satisfies column as well as row requirements simultaneously
- None of the above

MTH601 - Operations Research - Q. No. 13 M – 01

Consider the following simplex table corresponding to maximization problem.

Basic	x_1	x_2	x_3	S_1	S_2	S_3	R.H.S
Z	-4	-3	-2	0	0	0	0
x_1	0	0	1	1	0	0	8
S_2	-2	1	3	0	1	0	9
S_3	0	2	1	0	0	1	3

This is the indication that

- Problem has Multiple Optimal Solutions
- Problem has Unbounded Solutions
- Problem has Infeasible Solutions
- None of the above

MTH601 - Operations Research - Q. No. 14 M – 07

A manager has to allocate five different jobs to five workers. Depending on the efficiency and the capacity of the individual, the times taken by each worker to complete a job is given in the following table.

Jobs	Workers				
	W1	W2	W3	W4	W5
1	10	12	15	12	8
2	7	16	14	14	11
3	13	14	7	9	9
4	12	10	11	13	10
5	8	13	15	11	15

How the manager should assigned one job to a worker so as to minimize the total man-hours?

MTH601 - Operations Research - Q. No. 15 M – 05

Consider the following LP problem

$$\text{Maximize } Z = 10x_1 + 3x_2$$
$$\text{Subject to}$$
$$2x_1 + 3x_2 \leq 18$$
$$6x_1 + 5x_2 \geq 60$$
$$x_1, x_2 \geq 0$$

Solve the above problem by Graphical Method.

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MTH601 - Operations Research - Q. No. 16 M - 01

The Phase-I objective function Minimize $R_0 = \sum_{i=1}^{n} R_i$, where R_i are artificial variables is obtained by

- Dividing the Big-M method's objective function by 'M' and then dropping the negligible terms
- Dividing the Big-M method's objective function by '–M' and then dropping the negligible terms
- Multiply the Big-M method's objective function by 'M' and then dropping the negligible terms
- Multiply the Big-M method's objective function by '–M' and then dropping the negligible terms

MTH601 - Operations Research - Q. No. 17 M – 05

The following table is an initial table of M-technique for maximization problem.

Basic	x_1	x_2	x_3	S_1	S_2	R	R.H.S
Z	-3M-3	-2-4M	2M-3	0	M	0	-8M
S_1	2	1	1	1	0	0	2
R	3	4	2	0	-1	1	8

Write the original Mathematical Model (not the standard form of the model) from the above given table.