

Total No. of Questions : 5] [Total No. of Printed Pages : 5

RGPVONLINE.COM

MCA-301

M. C. A. (Third Semester)

EXAMINATION, Nov-Dec, 2007

COMPUTER ORIENTED OPTIMIZATION TECHNIQUES

[MCA-301]

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 40

Note : Attempt any two parts from each question. All questions carry equal marks.

1. (a) Solve the following Linear Programming Problem by graphical method :

Maximize :

$$z = 5x_1 + 7x_2$$

Subject to the constraints :

$$x_1 + x_2 \leq 4$$

$$3x_1 + 5x_2 \leq 24$$

$$10x_1 + 7x_2 \leq 35$$

$$x_1, x_2 \geq 0$$

- (b) Using Big-M method to solve the following L. P. P. :

Minimize :

$$z = 2x_1 - x_2$$

Subject to :

$$3x_1 + x_2 = 5$$

$$3x_1 + 3x_2 \geq 6$$

$$x_1 + 2x_2 \leq 3$$

$$x_1, x_2 \geq 0$$

- (c) Solve the following all integer L. P. P. using branch and bound method :

Minimize :

$$z = 3x_1 + 2.5x_2$$

Subject to :

$$x_1 + 2x_2 \geq 20$$

$$3x_1 + 2x_2 \geq 50$$

x_1, x_2 are non-negative integers.

2. (a) Determine the optimum assignment schedule of assigning five jobs to five persons. The assignment costs are given as follows :

		Job				
		1	2	3	4	5
Person	A	8	4	2	6	1
	B	1	9	5	5	4
	C	5	8	9	2	6
	D	4	3	1	6	3
	E	6	5	8	9	5

- (b) Solve the following transportation problem :

		To			Supply
		I	II	III	
From	1	2	7	4	5
	2	3	5	1	8
	3	5	4	7	7
	4	1	6	2	14
Demand		7	9	18	34

- (c) Find the sequence that minimizes the total time required in performing the following jobs on three machines in the order ABC :

Jobs	Machine A	Machine B	Machine C
1	8	3	8
2	3	4	7
3	7	5	6
4	2	2	9
5	5	1	10
6	1	6	9

3. (a) (i) How do you distinguish between CPM and PERT ?
 (ii) Discuss the rules for construction of network diagram.
 (b) Find the minimum time of completion of the project i. e. critical path for the following network :

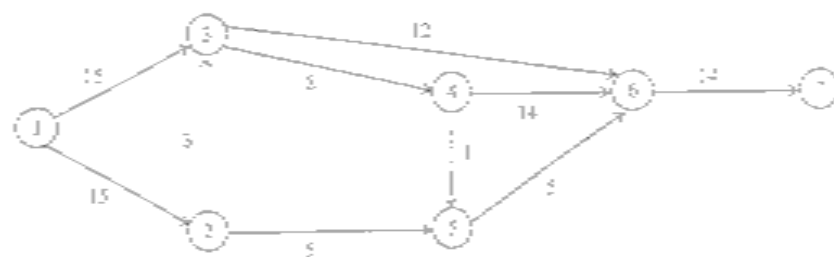


Fig. 1

- (c) A project is represented by the network given as :

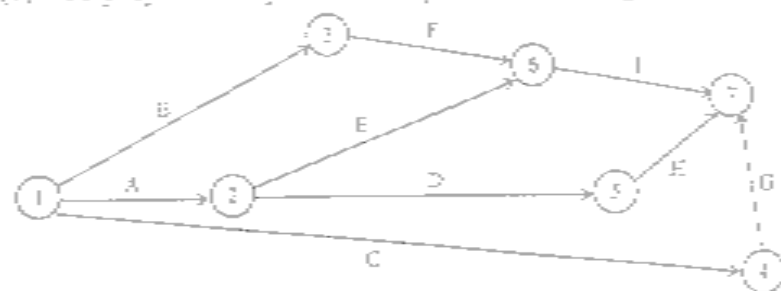


Fig. 2

and has the following data :

Task	Optimistic Time	Pessimistic Time	Most Likely Time
A	5	10	8
B	18	22	20
C	26	40	33
D	16	20	18
E	15	25	20
F	6	12	9
G	7	12	10
H	7	9	8
I	3	5	4

- (c) Determine the following :
 (i) expected task times and their variance.
 (ii) the earliest and latest expected times to reach each node.
 (iii) the critical path.
 (iv) the probability of a node occurring at the proposed completion date if the original contract time of completing the project is 41.5 weeks.

4. (a) A TV repairman finds that the time spent on his jobs has an exponential distribution with mean 30 minutes. If he repairs sets in the order in which they came in, and if the arrival of sets is approx. Poisson, with an average rates of 10 per 8 hour day. What is repairman's expected idle time each day ? How many jobs are ahead of the average set just brought ?

- (b) Consider a single server queuing system with Poisson input, exponential service times. Suppose the mean arrival rate is 3 calling units per hour, the expected

service time is 0.25 hour and the maximum permissible number calling units in the system is two. Derive the steady-state probability distribution of the number of calling units in the system and then calculate the expected number in the system.

- (c) Obtain steady-state equations and their solution for the model $(M/M/1 : \infty/\text{FCFS})$ of queuing system.
5. (a) What are the advantages and disadvantages of having inventory ?
- (b) Derive an economic lot-size formula and the minimum average cost of economic lot size model with different rates of demand in different production cycles, infinite production rate and having no shortages.
- (c) A manufacturer has to supply his customer with 600 units of his product per year. Shortages are not allowed and the storage cost amount to Rs. 0.60 per unit per year. The setup cost per run is Rs. 80. Find the optimum run size and the minimum average yearly cost.