



RM-7847

B. E. - IV (Sem. VIII) (Mech.) Examination
May / June - 2010
Industrial Management Techniques

Time : 3 Hours]

[Total Marks : 100

Instructions :

(1)

नीचे दृशावेव निशानीवाणी विगतो कनरवडी पर अवश्य लपवी.
Fillup strictly the details of signs on your answer book.

Name of the Examination :
B. E. - 4 (Sem. 8) (Mech.)

Name of the Subject :
Industrial Management Techniques

Subject Code No. : **7 8 4 7** Section No. (1, 2,.....): **1&2**

Seat No. :

Student's Signature

- (2) Attempt all the questions.
- (3) Figures to the right indicates full marks.
- (4) Assume suitable data if necessary.
- (5) Use separate answer books for each sections.

SECTION - I

- 1 (a) Answer the following : 10
- (i) Explain : Degeneracy in transportation problem.
 - (ii) Illustrate graphically "Infeasible solution" case of LPP.
 - (iii) Write down assumptions of LPP.
 - (iv) When the assignment problem is defined as an unbalance problem? Why?
 - (v) Write down the various assumptions made in sequencing problem.

- (b) Minimise the total transportation cost for the following problem. 10

Factories	Stores				Capacity
	1	2	3	4	
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Demand	25	35	105	20	

- 2 Using Penalty method 14

Maximize $z = 3x_1 - x_2$

s/t $2x_1 + x_2 \leq 2$

$x_1 + x_2 \geq 3$

$x_2 \leq 4$

$x_1, x_2 \geq 0$

Also write down its dual and dual solution from the primal.

OR

- 2 A firm manufactures two products A&B on which the profits earned per unit are Rs. 3 and Rs. 4 respectively. Each product is processed two machines M_1 and M_2 . Product A services one minute of processing time on M_1 and two minutes on M_2 while product B requires one minutes on M_1 and one minutes on M_2 . Machine M_1 is available for not more than 7 hours 30 minutes while machine M_2 is available for 10 hours during any working day. Find the number of units of product A and B to be manufactured to get maximum profit using simplex method.

3 Attempt any two :

16

(a) Find the minimum value of

$$Z = -x_1 + 2x_2$$

subject to $-x_1 + 3x_2 \leq 10$

$$x_1 + x_2 \leq 6$$

$$x_1 - x_2 \leq 2$$

$$x_1, x_2 \geq 0$$

Use graphical method.

(b) A method engineer wants to assign four new methods to three work centres. The assignment of method will increase the productions and they are given below. If only one method can be assigned to a work centre, determine the optimal assignment.

Methods	Increase in production (unit) work centres			
	<i>I</i>	<i>II</i>	<i>III</i>	<i>IV</i>
<i>A</i>	38	29	33	22
<i>B</i>	26	27	28	28
<i>C</i>	34	26	32	29
<i>D</i>	33	21	26	28
<i>E</i>	31	26	31	26

(c) Using graphical method calculate the minimum time needed to process the following jobs on the machines shown below i.e. for each machine find the job which should be done first. Also calculate the total time needed to complete both the jobs.

Job-1	Sequence	A	B	C	D	E
	Time	3	4	2	6	2
Job-2	Sequence	B	C	A	D	E
	Time	5	4	3	2	6

SECTION - II

- 4 (a) Answer the following in brief : 10
- (i) Define following term with respect to network analysis.
 - (a) Free Float
 - (b) Optimistic time
 - (ii) State value of game
 - (iii) What is slack?
 - (iv) The items which are subjected to _____ test must be inspected by sampling inspection only.
 - (v) State "Minimax criteria" of optimality.
 - (vi) Define "Fraction Defective"
 - (vii) What is process capability?
 - (viii) C-chart is based on _____ distribution.
 - (ix) Define saddle point.
- (b) (i) Explain assignable causes pattern of variation. 5
- (ii) Explain following w.r.t. network analysis. 5
- (a) Dangling
 - (b) Redundancy

- 5 Attempt following questions : 16

- (a) A project schedule has the following characteristics

Activities	Duration (Days)	Activity	Duration (Days)
1-2	3	5-6	5
1-3	1	5-7	8
2-4	1	6-8	1
2-5	1	7-9	2
3-5	5	8-10	4
4-9	6	9-10	6

Draw project network and find the critical path. Also calculate the total float, free float and independent float for each activity.

(b) A project is represented by the data given below :

Activity	to	tm	tp
1-2	5	8	10
1-3	8	20	22
1-4	26	33	40
2-5	16	18	20
2-6	15	20	25
3-6	6	9	12
4-7	7	10	12
5-7	7	8	9
6-7	3	4	5

- (i) Determine expected task and their variance.
- (ii) The earliest and latest expected times to reach each node.
- (iii) Critical path.

OR

(b) The following table gives data on normal time and cost, crashed time and cost for a construction project.

Activity	Time (days)		Cost (Rs.)	
	Normal	Crash	Normal	Crash
1-2	9	4	1300	2400
1-3	15	13	1000	1380
2-3	7	4	7000	1540
2-4	7	3	1200	1920
2-5	12	6	1700	2240
3-6	12	11	600	700
4-5	6	2	1000	1600
5-6	9	6	900	1200

Find optimum project time and corresponding minimum total project cost by crashing appropriate activities in proper order. The indirect cost is Rs. 400/day.

6 Attempt any two :

14

- (a) Reduce the following game by dominance property and solve it.

		B		
A	I	II	III	
I	-1	-2	8	
II	7	5	-1	
III	6	0	12	

- (b) A machine is set to deliver packets of a given weight. 10 samples of size 5 each were recorded. Below are given relevant data.

Sample No	Mean (\bar{X})	Range (R)
1	15	7
2	17	7
3	15	4
4	18	9
5	17	8
6	14	7
7	18	12
8	15	4
9	17	11
10	16	5

Calculate values for centreline and control limits for mean chart and then comment on the state of control.

(Conversion factors for $n=5$ are $A_2 = 0.58$, $D_3 = 0$, $D_4 = 2.11$)

- (c) (i) Explain different types of patent. 4
- (ii) Give meaning of following abbreviations WTO, GATT, WIPO.
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