* S F - 7 8 4 7 *

SF-7847

B. E. - IV (Sem - VIII) (Mechanical) Examination

May / June – 2011

Industrial Management Techniques

Time : **3** Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ **B. E. - IV (Sem - VIII) (Mechanical)**

Name of the Subject :

☛ **Industrial Management Techniques**

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

Seat No. :

Student's Signature

(2) Attempt all the questions.
(3) Figures to the right indicate full marks.
(4) Assume suitable data, if necessary.
Use table for :
(5) Area under normal curve.
(6) 36 limit for control chart and
(7) Passions exponential binomial limit
are allowed.

SECTION - I

1 (a) Answer the following : **10**

(i) What is the degeneracy in transportation problem?
(ii) Write down merits and demerits of LPP.
(iii) Write assumptions for Johnson's rule.
(iv) Explain the following term in case of LPP.
(a) Objective function.
(b) Redundant constraints.
(v) Explain the following term in case of LPP.
(a) Optimal solution.
(b) Unbounded solution.

(b) Find the optimal solution to the following transportation problem. **10**

		Ware house			
		I	II	III	Supply
	A	4	2	3	6
Source	B	5	4	5	10
	C	6	5	4	4
	D	6	1	7	8
	Demand	7	13	5	

Use VAM method to find IBFS.

2 A firm manufactures two product A and B on which the profits earned per unit are Rs. 3 and Rs. 4 respectively. Each product is processed on two machines M_1 and M_2. Product A requires one minute of processing time on M_1 and two minutes on M_2 while B requires one minute on M_1 and one minute on M_2. Machine M_1 is available for not more than 7 hrs. 30 minutes, while machine M_2 is available for 10 hrs during any working day.

Find (i) Formulate LPP. **3**

(ii) Solve the this LPP using simplex method. **8**

(iii) Write dual of the LPP. **3**

OR

2 Use Big M-method to **14**

minimize $z = 60x_1 + 80x_2$

$s/t \quad x_1 \leq 400$

$x_2 \geq 200$

$x_1 + x_2 = 500$

$x_1, x_2 \geq 0$.

3 Attempt any **two** : **16**

(a) Four jobs 1,2,3 and 4 are to be processed on each of the five machines A,B,C,D and E in the order ABCDE. Find the total minimum elapsed time if no passing of jobs is permitted.

M/C / Job	A	B	C	D	E
1	7	5	2	3	9
2	6	6	4	5	10
3	5	4	5	6	8
4	8	3	3	2	6

(b) Using graphical method find the maximum value of

$z = 2x_1 + 3x_2$

s/t $x_1 + x_2 \leq 30$

$x_2 \geq 3$

$x_2 \leq 12$

$x_1 - x_2 \geq 0$

$0 \leq x_1 \leq 20$.

(c) Solving the following assignment problem to minimize coste.

	1	2	3	4	5	6
A	12	10	15	22	18	08
B	10	18	25	15	16	12
C	11	10	03	08	05	09
D	06	14	10	13	13	12
E	08	12	11	07	13	10

4 (a) Attempt following questions. **10**

(i) Explain free float.

(ii) Define saddle point.

(iii) If all the points are above or below the centre line on $\bar{x}$ and R chart, the pattern of variation is called as _____.

(iv) Mathematically process capability is equal to _____.

(v) What do you mean by value of game ?

(vi) Define successor activity.

(vii) Define burst event.

(viii) State minimax criterion of optimality.

(ix) Define critical activity.

(x) Define two person zero-sum game.

(b) Answer the following. **10**

(i) Explain the various sampling plans.

(ii) Write a short note on characteristics of game theory.

5 Attempt the following. (any two) **16**

(a) Consider the following data for the activities of a project.

Activity	Immediate Predecessors	*Duration (days)*
A	–	2
B	*A*	3
C	*A*	4
D	*B,C*	6
E	–	2
F	*E*	8

Draw the network and find the critical path and various floats.

(b) A small project is composed of activities whose time estimates are listed in table. Activities are identified by their beginning (i) and ending (j) note number.

Activity $i-j$	*Optimistic time*	*Most likely time*	*Persi timstic time*
1–2	5	5	7
1–3	1	2	3
2–5	6	8	12
3–4	8	12	17
4–5	0	0	0
5–8	5	7	9
4–6	6	9	12
4–7	3	6	8
6–9	1	2	3
8–9	3	5	8
7–10	8	15	20
9–10	2	5	6

Draw the network of the project and find the critical path and the probability of completing the project in 35 days.

(c) The following table gives the activities in construction project and other relevant information.

Activity	Im*mediate predecessor*	*Time* (*Days*)		*Direct Cost* (*Rs.*)	
		Normal	*Crash*	*Normal*	*Crash*
A	–	4	3	60	90
B	–	6	4	150	250
C	–	2	1	38	60
D	*A*	5	3	150	250
E	*C*	2	2	100	100
F	*A*	7	5	115	175
G	*D*, *B*, *E*	4	2	100	240

Indirect costs vary as follows :

Days	15	14	13	12	11	10	9	8	7	6
Cost (Rs.)	600	500	400	250	175	100	75	50	35	25

(i) Draw an arrow diagram of the project.

(ii) Determine the project duration which will minimum total cost.

6 Attempt any **two** : **14**

(a) Solve the following game after seducing it to a 2×2 game.

Player B

Player A		B_1	B_2	B_3
	A_1	1	7	2
	A_2	6	2	7
	A_3	5	1	6

(b) (i) Explain importantance, history and types of patent.

(ii) Give meaning of following abbreviations :

(a) WTO

(b) PSL

(c) GATS.

(c) A weighting machine gives the packets of a given weight. Ten sample of size five each were checked and the weight were found to be as follows.

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean	49	42	38	45	47	45	37	51	46	44
Range	6	5	7	4	8	6	5	4	7	6

Construct a control chart for mean and the range and calculate the values for the centre lines and control limit for the mean chart and range chart for n=5, d_z=2.326, d_3=0.8649.
