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10MAR251

Second Semester M.Tech. Degree Examination, June 2012
Computer Aided Production and Operation Management

Time: 3 hrs.

Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Assume suitable data wherever necessary.

- 1 a. Solve the following problem using simplex method.
 Max. $Z = 3x_1 + 5x_2 + 2x_3$
 S.T. Constraints $x_1 + 2x_2 + x_3 \leq 13$
 $2x_1 + 3x_2 + x_3 \leq 16$
 $4x_1 + 3x_2 + 2x_3 \leq 20$
 $x_1, x_2, x_3 \geq 0.$ (14 Marks)
- b. Differentiate between transportation problem and assignment problem. (06 Marks)
- 2 a. A company wants to purchase a machine to increase the output of its production centre. It has to choose from 2 feasible alternative Machine A and Machine B, which have been identified to be suitable for the purpose. The relevant cash flow for each machine is given below :

Item	Machine A	Machine B
Purchase price (Rs)	50,000	60,000
Annual maintenance cost (Rs)	5,000	2,500
Annual revenue (Rs)	20,000	20,000
Useful life (yr)	6	6
Salvage value (Rs)	0	0

- If the rate of interest is 10%, which machine will you prefer? (12 Marks)
- b. Explain the different exponential smoothing models. (08 Marks)
- 3 a. An item for which the daily demand is 20 per day, is produced at the rate of 50 units per day. The set up cost is Rs 100 per cycle and the inventory holding cost is Re 0.02 per unit per day. Find i) the economic lot size ii) cycle time and iii) minimum cost/day. (09 Marks)
- b. What do you mean by buffer stock? Briefly explain. (05 Marks)
- c. With an example, explain dynamic inventory model. (06 Marks)
- 4 a. Write a note on MRP-II. (06 Marks)
- b. Four jobs are to be processed using three machines. The sequence of operations for all the jobs is 1-2-3. The time required by Job I on machine J is given in table below. Apply SPT rule to solve the problem. (14 Marks)

Job	Time required on		
	Machine 1	Machine 2	Machine 3
1	5	8	20
2	6	30	6
3	30	4	5
4	2	5	3
Total	43	47	34

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

- 5 a. Differentiate between : i) Chance causes and assignable causes ii) Producers risk and consumers risk. (10 Marks)
- b. A textile company inspects 100m² of cloth every day. The number of defects found in the daily sample of 100m² for the last 10 days are given in table :

Day	1	2	3	4	5	6	7	8	9	10
Quantity inspected (m ²)	100	100	100	100	100	100	100	100	100	100
No. of defects (c)	2	3	1	4	4	0	2	1	4	2

By using the above data construct C chart for quality control in the future. (10 Marks)

- 6 a. With an example, explain the concept of Juran’s Trilogy. (06 Marks)
- b. The precedence relationships and the time estimates for the activities of a PERT network are given below :

Activity	Predecessor (s)	Duration (weeks)		
		Optimistic (a)	Most likely (m)	Pessimistic (b)
A	-	6	7	8
B	-	1	2	9
C	-	1	4	7
D	A	1	2	3
E	A, B	1	2	9
F	C	1	5	9
G	C	2	2	8
H	E, F	4	4	4
I	E, F	4	4	10
J	D, H	2	5	14
K	I, G	2	2	8

- i) Construct the project network.
- ii) Find the expected duration and variance of each activity.
- iii) Find the critical path and expected project completion time.
- iv) What is the probability of completing the project on or before 25 weeks? (14 Marks)

- 7 a. What are the common heuristic algorithms used for plant layout? (06 Marks)
- b. A small electrical appliance is to be produced on a single model assembly line. An assembly consists of 12 operations. The time required and the precedence requirement for each operation are given below. Annual demand is 1,00,000 unit/yr. The line operates 50weeks/yr, 5 shift/week and 7.5hr/shift.

Operation	1	2	3	4	5	6	7	8	9	10	11	12
Time (min)	0.2	0.4	0.7	0.1	0.3	0.11	0.32	0.6	0.27	0.38	0.5	0.12
Precedence operation	-	-	1	1, 2	2	3	3	3, 4	6, 7, 8	5, 8	9, 10	11

- i) Draw the precedence diagram.
- ii) Determine the required production rate R_p to achieve annual demand. (14 Marks)
- iii) Cycle time by considering efficiency as 96% and also calculate number of work station.

- 8 a. Briefly explain the following :
 i) Supply chain management and ii) Factory of future. (10 Marks)
- b. With suitable example, explain lean manufacturing and system simulation. (10 Marks)