BE-sem-VII - old-Mech

MPC

17/12/15

QP Code : **2285**

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data wherever **required**.
(4) Illustrate answers with **sketches** wherever **required**.

1. Explain any **four** of the following :— 20
   (a) Material Requirements Planning MRP–I
   (b) Bill of Materials (BOM)
   (c) Rough Cut Capacity Planning
   (d) Production Activity Control (PAC)
   (e) Master Production Scheduling (MPS).

2. (a) A firm believes that its annual profit depends on its expenditures for research. The information for the preceding years is given below. Estimate the profit when expenditure is 7 units. 10

Year	Expenditure for research	Annual Profit (Y)
2000	1	10
2001	3	25
2002	6	35
2003	4	30
2004	12	42
2005	5	31
2006	7	—

   (b) Explain importance of forecasting in production industry. Explain any two forecasting models with their graphical representation. 10

3. (a) An Engineering component manufacturer has the plan of buying a Press tool machine which can be manufactured as 1,70,000 products per year. The press tool machine is a part of a product line. The system efficiency of the product line is 85%. 10
   (i) What is the required systems capacity ?
   (ii) Assume that it takes 100 seconds to mould each part and the plant operates 2000 hours per year. If the press tool machines are used only 60% of the time and are 90% efficient, what is the actual output of the press tool machine per hour ?
   (b) What are the different modules in three levels of manufacturing resource planning and explain Aggregate Planning module briefly. 10

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4. The forecast for a group of items is reproduced below. 20

Year	Demand	Cumulative Demand
1	1080	1080
2	880	1960
3	1880	3840
4	2680	6520
5	1800	8320
6	1080	9400
7	800	10200
8	1480	11680

(i) Suppose that the firm estimates that it costs Rs. 150 per unit to increase the production rate, Rs. 200 per unit to decrease the production rate, Rs. 50 per unit per quarter to carry the items on inventory and Rs. 100 per unit if sub contracted. Compare the cost incurred if pure strategies are followed.

(ii) Given these costs, Evaluate the following mixed strategy.
The company decides to maintain a constant production rate of 250 units per year and permits 20% overtime when the demand exceeds the production rate. The incremental cost of overtime is Rs. 25 per hour. It plans to mee the excess demand by hiring and firing of workers.

5. (a) Following are the summarized details of a project involving 14 activities. Duration of the activities are given in months. 12

(i) Draw the network
(ii) Determine the critical path and Determine the project duration
(iii) Calculate the total floats and free floats for non-critical activities.

Activity	Immediate Predecessor (s)	Duration (months)
A	–	2
B	–	6
C	–	4
D	B	3
E	A	6
F	A	8
G	B	3
H	C, D	7
I	C, D	2
J	E	5
K	F, G, H	4
L	F, G, H	3
M	I	13
N	J, K	7

(b) Explain concept of Lean Manufacturing production systems. 8

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6. (a) Solving the following LP problem using Simplex method. 14

Maximize $Z = 100X_1 + 150X_2 + 200x_3$

Subject to

$$20X_1 + 40X_2 + 60X_3 \leq 240$$
$$30X_1 + 90X_2 + 60X_3 \leq 300$$
$$X_1, X_2 \text{ and } X_3 \geq 0$$

(b) Explain Sensitivity analysis in the context of linear programming model with change of characters, new constraint and new variable. 6

7. (a) Determine the least square regression equation A and B of the following. 12

A	75	87	67	92	101	72	79	80	82
B	87	86	91	92	73	72	78	84	82

(b) Five different jobs can be done on five different machines. The matrix below gives the cost (in Rs.) of producing each job J1, J2, J3, J4 and J5 on the machines M1, M2, M3, M4 and M5. How the jobs should be assigned so that the total cost is minimum. 8

	M1	M2	M3	M4	M5
J1	10	12	15	12	8
J2	7	16	14	14	11
J3	13	14	7	9	9
J4	12	10	11	13	10
J5	8	13	15	11	15
