B.E/B.Tech (FULL TIME) DEGREE END SEMESTER EXAMINATIONS – APRIL/MAY 2013

INDUSTRIAL ENGINEERING

$|\cancel{7}$

SIXTH SEMESTER

IE 9355 – PRODUCTION PLANNING AND CONTROL

(Regulation 2008)

Answer ALL Questions

Time: 3 Hours   Max.Marks:100

PART – A (10 X 2 = 20 Marks)

1. What are the strategies the operations managers can follow to improve productivity of an organisation?
2. When and why mathematical models are used in decision making process?
3. How Delphi method is used for demand forecasting?
4. A newly joined Industrial Engineer in a toy manufacturing company related the month-end retail sales for a month using regression analysis. He found the relationship

$$T = 3.2 - 0.46\ D$$

   Where T = month – end inventory in million rupees, D=Sales in million rupees per month what could be the reason for a negative relationship between T and D?
5. Differentiate Aggregate Production Planning with Master Production Schedule
6. What do mean by Requirement explosion and Pegging in MRP?
7. What is capacity planning?
8. What do you mean by finite and infinite loading?
9. Define the term "scheduling"
10. What are the objectives of production activity control?

PART – B (5 X 16 = 80 Marks)

11. Read the following case carefully and answer

In 1990, Suji started up a basic, jobbing engineering business, SP Engineering (SP), making small engineering items or components in the local area. Since then SP has expanded and prospered to some 40 employees, still doing basic jobbing work for many medium and large companies in the surrounding area. It has the reputation of being able to turn to almost any type of high quality jobbing work in the metal forming business.

With the desire to produce great variety, SP has a large number of different types of metal forming type machines (drilling, turning, welding etc.). SP is a very lean business and employs few people other than the skilled shop-floor workers, most of whom have multi-skills in the engineering field and have been with the company for many years.

I

Production planning and control at SP is fairly rudimentary with a simple PC- based network analysis system for the considerable number of projects which are normally on the floor at any one time.

Recently, SP has made a prototype lifting gear mechanism for a range of hospital beds that a medical supply company is trying to develop; this has been successful and SP has been invited to supply the lifting gear for the whole range of medical beds that are to be produced in considerable numbers. Suji is very flattered by the approach but is apprehensive at taking on such work. She confides in Vishal, his Production Manager: "This is a very different type of work from our normal business; we are good at doing one – offs but making large batches of a range of similar products is a different kettle of fish altogether; I am not sure I understand the full implications of such a move. The business would change dramatically, I think, and the turnover would go up – but would we make much profit at it? I would like to continue with our existing type of work; could we do both? Should we 'stick to our knitting'?"

(All the names of individuals and companies contained in this case study is fictional. Any resemblance to actual individuals or companies is purely coincidental.)

Question

Taking the role of the operations manager, examine the issues that would need to be addressed and the changes that would need to be made if SP were to take on the new work as well as continue with the old. Also suggest some production activity control actions to manage the change

12a. A hotel has experienced the following room occupancy rates for the 9 years since its inception

Year	1	2	3	4	5	6	7	8	9
Occupancy Rate (%)	83	78	75	81	86	85	89	90	86

Compute an exponential smoothing forecast with $\alpha = 0.20$ and an exponential smoothing with $\alpha = 0.20$ and $\beta = 0.20$. Compare the two methods and indicate which method is more accurate.

(6+6+4)

(OR)

12b. The tensile strength of paper is related to the amount of hard wood in the pulp. The samples are produced in the pilot plant and the data obtained are shown below:

Strength	160	171	175	182	184	181	188	193	195	200
% of hard wood	10	15	15	20	20	20	25	25	28	30

(i) Fit a simple linear regression model to the above data. (7)

(ii) Compute r, r^2 and s_e the standard error of estimate for the regression line. What is its interpretation with respect to this problem? (3+3+3)

13a. Alpha company produces calculators and has forecast demand over the next four quarters as shown below. Each quarter has 60 working days. The company maintains constant work force of 40 employees and there are no subcontractors available who can meet its quality standards. The company can, however, go on overtime if necessary and encourage customer to back-order calculators. Production and cost data are as follows:

Quarter	1	2	3	4
Units	2000	1500	1700	2000

Production capacity:

Initial Inventory: 400 units

Ending Inventory:100 units

Regular time hours: 40 employees x (60 days/quarter)x 8 hr/day= 19200 hr/period

Overtime hours= 40 employees x (60 days/quarter) x (4 hr/day)=9600 hr/day

Standard labor hr/unit= 15hrs

Labor: Regular time cost = Rs. 10/ hr

Overtime cost = Rs. 15/hr

Material and Overhead (Regular time) = Rs.100/unit

Material and overhead (Over time) = Rs. 60/ unit

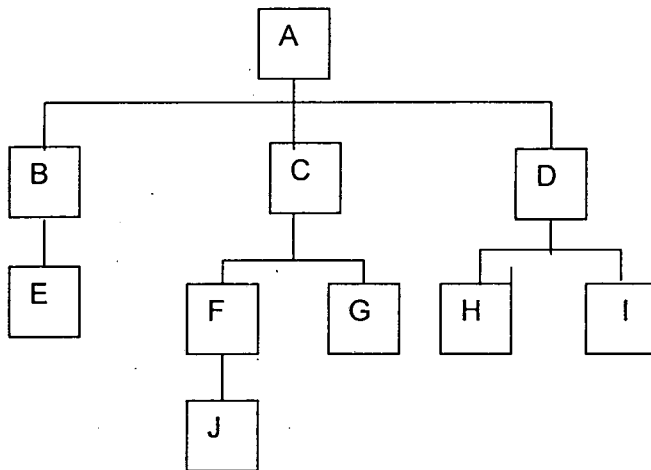Cost of unutilized capacity during regular time = Rs. 60/unit

Back order cost: apportioned at Rs. 5/unit/period.

Inventory carrying cost = Rs. 10/unit/period.

Formulate this problem as a transportation problem and Solve.

(OR)

13b. Given the following product structure, BOM and Inventory status, develop MRP tables for all items.(Consider net requirement as Lot size)

Bill of Materials

Item	No.Reqd	Initial stock	LT
A	1	0	1
B	1	30	2
C	1	30	1
D	1	50	2
E	1	100	3
F	1	25	1
G	1	50	2
H	1	75	3
I	1	80	2
J	1	25	1

Master Production Schedule

Week	1	2	3	4	5	6	7
Scheduled Quantity	100	100	90	80	150	200	230

14a.(i)The copy center in an office building prepares bound reports from two clients. The center makes multiple copies (the lot size) of each report. The processing time to run, collate and bind each copy depends on, among other factors, the number of pages. The center operates 250 days per year, with one eight hour shift. Management believes that a

capacity cushion of 15 percent (beyond the allowance built into time standards) is best. Based on the following information, determine how many machines are needed at the copy center? (8)

Item	Client X	Client Y
Annual demand forecast(copies)	2000	6000
Standard processing time(hr/copy)	0.5	0.7
Average lot size(copies/report)	20	30
Standard setup time(hours)	0.25	0.40

(ii) Vani & Co., own a small accounting service and one personal computer. If the customer keep organized records, either of the owners can use the computer to prepare one tax return per hour, on average. During the first two weeks of April, the company works seven 12 hours shifts. This allows them to use their computer around the clock.

(1) What is the peak capacity measured in tax returns per week? (4)

(2) During the third week of January, the company processed 40 tax returns. What is their utilization, as the percentage of effective capacity? (4)

(OR)

14b.(b) (i)

An automobile brake supplier operates two shifts of 8 hours each, five days per week, 52 weeks per year. The demand data and time standards for five component are given below:

Component	Time standard		Lot size	Demand (Units)
	Process time (hrs/unit)	Set up time (hrs/lot)		
A	0.05	1.0	60	18,000
B	0.20	4.5	80	13,000
C	0.05	8.2	120	25,000
D	0.25	6.5	140	35,000
E	0.20	8.0	180	40,000

Allow a 25 percent capacity cushion and determine the number of machines required (8)

(ii). Briefly explain Rough cut Capacity planning method with an example (8)

15a. Write short notes on the following:
   i.   Decision Support System (8)
   ii. Factors to be considered in process selection (8)

(OR)

15b. Write short notes on the following:
   i.   Relationship of operations with other Functional areas (8)
   ii. Objectives and Scope of Operation Management (8)

****

4