

2001 (May)

PRODUCTION AND OPERATIONS
MANAGEMENT

Paper-202

Full Marks - 75

Time - Three hours

The figures in the margin indicate full marks for the questions.

Answer any five questions.

1. (a) Discuss the steps in a new product design process. Under what circumstances might a market-driven approach or a technology-driven approach to new product design to be the best approach? 6
- (b) Explain the relationship between quality and productivity. Discuss the theory that says that quality and productivity—
(i) move in the same direction or (ii) move in the opposite directions. 8
2. (a) Critically examine the operational issues in the Product Life Cycle. 4
- (b) List the various characteristics of process technology. 5
- (c) Explain how a flexible manufacturing systems differ from a job shop and from an assembly line system. 5

Turn over

(b) The daily demand for a component assembly item is normally distributed with a mean of 120 and standard deviation of 15. Furthermore, the source of supply is reliable and maintains a constant lead time of 4 days. If the cost of placing the order is Rs. 25 and annual carrying cost are Rs. 0.75/unit, find the order quantity and reorder point to provide a 95% service level.

7. (a) What is meant by cost of quality? Describe its four components. 20
- (b) Contrast and compare acceptance sampling and process quality control.

8. Write brief notes on the following:

- (a) Computer-Aided Manufacturing (CAM) and its benefits. 19
- (b) Q/R versus Periodic inventory system. 19
- (c) JIT manufacturing system. 26

First National Bank is considering building a new Central Processing Facility (CPF) to process cheques for 4 existing branch banks. This new facility will not be open to the public. Locations of each branch and the monthly volume processed from each branch is shown in the table below. The main bank has coordinate (0,0). The cost of transportation is Rs. 100/1000 items processed/km for each branch.

Branch	Coordinate Location (x, y)	Volumes (000) to Main Branch
A	(50, 100)	60
B	(150, 150)	50
C	(100, 50)	70
D	(200, 0)	100

Find the best site for the CPF using simple median model and the total shipping cost. *51*

Examine how different types of layout design apply to different situations. *8*

Compare and contrast the characteristics of the intermittent and continuous operations. *5*

220 units to be produced in 320 units/day

(b) Task, task time and required predecessors are given in the table for a food processing plant.

Task	Task time (in mins)	Required Predecessors
A	30	none
B	60	A
C	70	A
D	50	A
E	20	A
F	40	C, B
G	50	C
H	50	D, E, F, G

- 70* (i) What is the theoretical minimum cycle time?
- (ii) Balance the line using LOT rule.
- (iii) Calculate the efficiency of the balanced line.

5. (a) Outline the purposes of MRP and explain how an MRP system can achieve these purposes. *253*

(b) Define JIT manufacturing. Review Shigeo Shingo's seven-wastes. *265*

6. (a) An order has been received for delivery of 250 units of product A in the week 5. The product structure of A is given below. If no stock is available or on order, determine the size of each order and when to release each order. (LTs are in weeks.)