

Fifth Semester Examination – 2008

PRODUCTION AND OPERATIONS
MANAGEMENT

Full Marks – 70

Time : 3 Hours

Answer Question No. 1 which is compulsory
and any five from the rest.

The figures in the right-hand margin
indicate marks.

1. Answer the following questions : 2x10
- (a) Name the different types of charts used for motion study.
- (b) Name five qualitative factors commonly considered for facility location decisions.

P.T.O.

- (c) List down the costs included in annual carrying cost.
- (d) Name three methods of lot sizing that used when the demand is lumpy.
- (e) Name the wastes in manufacturing.
- (f) A master production schedule contains which information ?
- (g) What do you understand by free float ?
- (h) What type of production layout is being followed for construction of concrete river bridge ?
- (i) What are the main characteristics of a JIT system ?
- (j) What is Johnson's rule ?

2. In a factory, Seven jobs are performed on three machines (in order of A, B and C). The time required for each job on each machine is given below. On the basis of the information, identify the optimal sequence and calculate the in and out time for each job on each machine and the total elapsed time. 10

| Job | Machine - 1 | Machine - 2 | Machine - 3 |
|-----|-------------|-------------|-------------|
| A | 3 | 4 | 6 |
| B | 8 | 3 | 7 |
| C | 7 | 2 | 5 |
| D | 4 | 5 | 11 |
| E | 9 | 1 | 5 |
| F | 8 | 4 | 6 |
| G | 7 | 3 | 12 |

3. Harley India plans to produce a security system name "Soldier". The annual fixed cost for the production process is expected to be Rs. 92.5 lacs and the variable cost per "Soldier" is

Rs. 3800. The company expects to sell the soldiers for Rs. 4950 each. 10

- (a) How many soldiers must be sold each year to break even ?
- (b) How much annual revenue is required to break even ?
- (c) If 15000 soldiers are sold in one year, how much profit will be earned ?
- (d) If annual sales are expected to be 15000 soldiers, what should be the selling price need to be in order to earn a profit of Rs. 1.5 crore ?

4. Calculate the trend adjusted forecasts using the following data: 10

| Quarter | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Demand | 213 | 201 | 198 | 207 | 220 | 232 | 210 | 217 | 212 | 225 |

Further, given initial estimate = 208, initial trend = 0, $\alpha = 0.2$ and $\beta = 0.1$.

5. List and explain the prerequisites of JIT manufacturing. Elaborate why each is a prerequisite. 10
6. Describe the relationship between process design and product design. What is simultaneous engineering? What are its advantages? 10
7. A project has the following list of activities along with their time of completion, precedence relationship, normal and crash activity times and normal and crash costs associated with it:

| Activity | Preceding Activity | Required Time (Weeks) | | Cost (Rs.) | |
|----------|--------------------|-----------------------|-------|------------|-------|
| | | Normal | Crash | Normal | Crash |
| A | - | 3 | 2 | 18000 | 15000 |
| B | - | 8 | 6 | 600 | 1000 |
| C | B | 6 | 4 | 10000 | 12000 |
| D | B | 5 | 2 | 4000 | 10000 |
| F | A | 13 | 10 | 3000 | 9000 |
| F | A | 4 | 4 | 15000 | 15000 |
| G | F | 2 | 1 | 1200 | 1400 |
| H | C, E, G | 6 | 4 | 3500 | 4500 |
| I | F | 2 | 1 | 7000 | 8000 |

- (a) Draw the project network diagram and find the critical path 3
- (b) If a deadline of 17 weeks to be imposed for completion of the project, which activities are to be crashed and what would be the additional costs. 7
8. Bajaj Electricals buys electrical switches locally for use in its assembly of a variety of electrical products. Bajaj observes that the usage pattern of these bought out switches follow a normal distribution with mean of 1000 switches per week and a standard deviation of 200. The buying process takes one week. The inventory holding cost is Rs. 5/- per unit per year and the cost of

ordering is Rs. 200/- per order. Bajaj desires to allow only 2 stock-out situations in a year.

Compute the safety stock required. 10