

Roll No.

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B.E. (Full Time) DEGREE END SEMESTER EXAMINATIONS, APRIL / MAY 2013
INDUSTRIAL ENGINEERING
 Semester III
IE9302 OPERATIONS RESEARCH II
 (Regulation 2008)

④

Time: 3 Hours

Answer ALL Questions

Max. Marks 100

Part A (10 X 2 = 20 Marks)

1. List and explain the various costs associated with inventory management
2. Define lead time.
3. What is the use of buffer stock?
4. State any two selective inventory classification systems
5. What is the difference between pure strategy & mixed strategy in game theory ?
6. Define Zero sum game.
7. Explain balking with respect to waiting lines.
8. Explain Kendal's notations for Queuing System.
9. Differentiate between individual and group replacement policies.
10. Define economic life of an equipment.

Part – B (5 x 16 = 80 Marks)

- 11a. Derive the formula to determine the economic production quantity. (6)
- 11b. A firm can manufacture 250 bearing per day for its internal use. These bearings are required at the rate of 100 bearing/day. The cost of holding is ₹ 20 per bearing per year and it costs ₹ 180/ per set up. How frequently should the production be made and by how much? (10)
- 12a. Find the optimal order quantity for a product where the annual demand for the product is 6000 units, the cost of storage per unit per year is 18% of unit cost and ordering cost per order is ₹.600/-. The unit costs are

Quantity	Unit cost in ₹
$0 \leq q_1 < 2000$	20.00
$2000 \leq q_2 < 4000$	15.00
$4000 \leq q_3$	9.00

Also find out the total cost and number of orders placed per year

(OR)

- 12b. The annual demand for an item is 48,000 units. Lead time demand follows normal with a mean of 300 and standard deviation of 170. The cost of ordering is ₹ 500 per order and cost of carrying is 20% per unit per year of purchase cost. Purchase price of an item is ₹ 15. Assuming 95% service level determine :
 Reorder level, Maximum Inventory and Average inventory

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- 13a. Machines arrive for repair at the rate of 6 per hour following poisson. The mechanics mean repair time is 15 minutes, which follows exponential distribution. The down time cost for the broken down machines per hour is ₹ 300. Mechanics are paid ₹ 60 per hour. Determine the optimal number of mechanics to be employed to minimize the total cost.

(OR)

- 13b. The arrival of employees at a tool crib can be described by a Poisson distribution. Service times are exponentially distributed. The rate of arrival averages 45 machinists per hour, while an attendant can serve an average of 50 men each hour. The machinists are paid ₹.24/- per hour while the attendants are paid ₹15/- per hour. Find the optimum number of attendants to place in the crib.

- 14a. Discuss the steps in the decision theory approach and the different environments in which decisions are made.

(OR)

- 14b. Obtain the optimal strategies for both players and value of the game for two-person zero sum game whose pay-off matrix is as follows:

	B1	B2
A1	-6	7
A2	4	-5
A3	-1	-2
A4	-2	5
A5	7	-6

- 15a. A firm is considering when to replace one of its machines, whose initial value is ₹.12,200/-. The other cost details are given below:

Year	1	2	3	4	5	6	7	8
Running Cost ₹ (000)	15	16	18	21	25	29	34	40
Salvage Value ₹ (000)	35	25	17	12	8	8	5	5

Help the company to find the economical replacement policy.

(OR)

- 15b. A firm is considering replacement of an item whose first cost is ₹ 4000 and the scrap value is negligible at the end of any year. Based on experience, it has been found that the maintenance cost is zero during the first year and ₹1000 for the second year and increases by ₹ 300 per year there afterwards. Assuming interest rate as zero determine when the equipment should be replaced.