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Roll No. | | | | | | | | | | |

B.E/B.Tech [F.T] END SEMESTER EXAMINATIONS April/May 2019

INDUSTRIAL ENGINEERING

Semester V

IE8502 – OPERATIONS RESEARCH - II
(Regulation 2012)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

PART-A (10 x 2 = 20 Marks)

1. List the various inventory control techniques.
2. What is 'p' system and 'Q' system?
3. What is normal lead time and maximum lead time?
4. List the advantages of buffer stock.
5. Name few criteria's considered for making decision under uncertainty.
6. What is saddle point in game theory?
7. List few assumptions considered in single server queuing model?
8. Write the general form of Kendal's notation.
9. Define critical point.
10. What is local minima?

ADDITIONAL CONTROLLER OF EXAMINATIONS ★ AU CHENNAI 600 025

Part – B (5 x 16= 80 marks)

11. a The demand rate for an item in a company is 1200units per year. The company can produce at the rate of 200/month. The set up cost Rs.6000 per order and the holding cost is Rs. 0.25 per unit per month. Calculate

i) The optimum manufacturing quantity.
2) The maximum inventory.
3) The time between orders.
4) The number of order per year.
5) The time of manufacture.
6) The optimum annual cost is Rs 40/unit.

12. a) The annual demand of a product is 36000 units. The average lead time is 3 weeks. The standard deviation of demand during the average lead time is 150 units per week. The cost of ordering is Rs. 500 per order. The cost of purchase of a product per unit is Rs. 15. The cost of carrying per unit per year 20% of the purchase price. The maximum delay in lead time is 1 week and the probability of this delay is 0.3. Assume service level 0.95 (z= 1.645)

a) What is reorder level if Q system followed?

b) What is the maximum inventory level of P system is followed

(OR)

12 b) Find the optimum order quantity for a product for which the price breaks are as follows.

Order Quantity	Unit cost (Rs.)
$0 < Q_1 < 1000$	250.00
$1000 \leq Q_2$	200.00

The monthly demand for the product is 4000 units. The storage cost is 15% of the unit cost of the product per month and the cost of ordering is Rs300/month.

13. a) Two companies A and B are competing for the same product. Their different strategies are given in the following pay-off matrix:

	Company B		
Company A	3	-4	2
	1	-3	-7
	-2	4	7

Determine the best strategies for both players

(OR)

b) Consider the following cost matrix and determine the best order size using the

(i) Laplace criterion
(ii) Minimax criterion
(iii) Maximum criterion
(iv) Savage criterion

Order size	Demand				
	50	100	150	200	250
75	50	125	375	375	125
150	40	500	100	250	500
225	750	550	250	750	125
300	500	40	500	400	540

What is the best alternative of above criteria?

14. a) A bank has two tellers working on saving accounts. The first teller handles withdraws only. The second teller handles deposits only. It has been found that the service times distribution of both deposits and withdraws are exponential with a mean service time of 3 minutes per customers. Depositors and withdrawers are found to arrive in a Poisson fashion throughout the day with mean arrival rate of 16 and 14 per hour. What would be the effect on the average waiting time for depositors and withdrawers if each teller could handle both withdraws and deposits. What would be the effect if this could only be accomplished by increasing the service time to 3.5 minutes?

(OR)

b) At a central warehouse, vehicles arrive at the rate of 18 per hour and the arrival rate follows Poisson distribution. The unloading time of the vehicles follows exponential distribution and the unloading rate is 6 vehicles per hour. There are 4 unloading crews. Find the following

i) P_0 ii) P_3 iii) L_q iv) L_s v) W_q vi) W_s

15. a) Solve the following nonlinear programming using Lagrangean method

Maximize $Z = 4X_1 - 0.02X_1^2 + X_2 - 0.02X_2^2$

ST

$X_1 + 2X_2 = 120$

X_1 and $X_2 \geq 0$

(OR)

b) Solve the following nonlinear programming problem using Kuhn-Tucker conditions.

Maximize $Z = 4X_1+6X_2-2X_1^2-2X_1X_2-2X_2^2$

Subjected to

$X_1 + 2X_2 \leq 2$

$X_1, X_2 \geq 0$