G 2017 (Pages : 3) Reg. No.....

Name.....

M.Sc. DEGREE (C.S.S.) EXAMINATION, JUNE 2016

Fourth Semester

Faculty of Science

Branch I (A)—Mathematics

MT 04 E07—OPERATIONS RESEARCH

(2012 Admissions—Regular)

Time : Three Hours Maximum Weight : 30

Part A

Answer any **five** *questions.*

Each question carries weight 1.

1. Explain the terms safety stock and lead time in inventory.
2. What is Re-order point ?
3. Define the terms queuing model and queue discipline.
4. Explain transient and steady state of queuing systems.
5. What is serial multistage model.
6. Explain general algorithm for solving a dynamic programming problem (DPP).
7. Define total elapsed time and idle time.
8. Define sampling distributions.

$(5 \times 1 = 5)$

Part B

Answer any **five** *questions.*

Each question carries weight 2.

9. Explain the various inventory models.
10. The annual demand for an item is 3200 units. The unit cost is Rs 6 and inventory carrying charges 25 percentage per annum. If the cost at one procurement is Rs. 150 determine :
    (a) Economic Order Quantity.
    (b) Number of orders per year.
    (c) Time between two consecutive orders.
    (d) The total optimal cost including purchase cost.

Turn over

11. Explain the role of exponential distribution in queuing theory.

12. Discuss the applications of single server models and multiple server models in queuing theory.

13. Explain the three basic characteristics of dynamic programming problem.

14. Use dynamic programming to find maximum value of $Z = X_1^2 + 2X_2^2 + 4X_3$ subject to

$X_1 + 2X_2 + X_3 \leq 8, X_1, X_2, X_3 \geq 0.$

15. What is meant by no passing rule ?

16. The past data of demand for an item per week is as given below :

Demand per week :	0	5	10	15	20	25
Frequency :	2	11	8	21	5	3

Using the following sequence of random numbers, generate the demand for the next 10 weeks. Find the average demand per week.

Random numbers : 83, 67, 23, 66, 94, 52, 35, 90, 13, 34.

$(5 \times 2 = 10)$

Part C

Answer any **three** *questions.*
Each question carries weight 5.

17. Derive expression for economic order quantity and optimum stock level when shortages are permitted. (Regarding costs and other parameters, suitable assumptions may be made).

18. Explain the generalized queuing models.

19. (a) Obtain the notion of busy period with reference to a queuing system.

(b) Derive the expression for expected number in the queue given that the queue is not empty in the case of (M/M/1): (GD//) queue.

20. (a) Explain the recursive nature of computations in dynamic programming.

(b) Solve using dynamic programming :

Minimize $Z = y_1^2 + y_2^2 + y_2^3$

Subject to the constraint $y_1 + y_2 + y_3 \geq 15$

$y_1, y_2, y_3 \geq 0.$

21. Explain graphical method to solve 2 jobs through k machine sequencing problem with given technological ordering for each job.

22. (a) Explain Monte-Carlo simulation procedure. Describe the various steps involved in such procedure.

(b) Discuss the method to generate random numbers using the density function :

$$f(x) = \begin{cases} \frac{1}{\beta(2,4)} x^{2-1}(1-x)^{4-1}, 0 < x < 1 \\ 0, \text{otherwise} \end{cases}$$

$(3 \times 5 = 15)$