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VI Semester B.Sc. Degree Examination, August/September - 2023

STATISTICS

Operations Research

(CBCS Scheme 2020 Freshers)

Paper - VIII

Time : 3 Hours

Maximum Marks : 70

Instructions to Candidates :

- i) Answer Five questions from Section A and Five questions from Section B.
- ii) Calculators are permitted.

SECTION - A

I. Answer any FIVE questions from the following.

(5×5=25)

1. What is operations Research (OR) ? Describe various types of OR models.
2. State the characteristics of a Linear Programming Problem (LPP). Distinguish between canonical and standard forms.
3. Define the following with respect to Transportation problem.
 - i) Feasible solution
 - ii) Basic feasible solution
 - iii) Optimum solution
4. Define the following with respect to Transportation problem:
 - i) Strategy
 - ii) Saddle point
 - iii) Pay-off
 - iv) Pure and mixed strategy.



[P.T.O.]



5. What is meant by inventory? State its objectives and its limitations.
6. What is a replacement problem? Obtain an optimum replacement policy for replacing of items when the value of money remains same over a period of time.
7.
 - a) Define Traffic intensity.
 - b) Distinguish between steady and Transient states of a queuing system.
8. For a $(M/M-1) : (FIFO/\infty/\infty)$ queuing model, obtain the expression for
 - i) Expected number of customers in the system
 - ii) Average waiting time.

SECTION - B

II. Answer any FIVE questions from the following.

(5×9=45)

9.
 - a) Obtain all basic solutions to the system of equations $x_1 + x_2 + 2x_3 = 4$ and $2x_1 - x_2 + x_3 = 2$. And identify which of the feasible solution maximizes $z = 2x_1 + 5x_2 - 4x_3$
 - b) Explain graphical method of solving a LPP. How do you identify the situation of multiple optimum solutions?
- (5+4)
10.
 - a) Write down the steps involved in the simplex method of solving a LPP.
 - b) What are artificial variables?
- (7+2)
11.
 - a) State the conditions under which LPP has Pseudo optimal solution.
 - b) Define dual of a LPP. Explain the procedure of formulation of dual problem.
- (3+6)
12.
 - a) Give the mathematical formulation of Assignment Problem (AP)
 - b) Explain various steps involved in finding on optimal solution to a Transportation Problem (TP)

(3+6)



(3)

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13. a) State and Prove the necessary and sufficient condition for the existence of a feasible solution to a $(m \times n)$ transportation problem.

b) Explain Hungarian algorithm of solving an Assignment Problem.

(4+5)

14. a) Explain the properties of a game problem.

b) Derive expressions for optimal mixed strategies of (2×2) game problem without a saddle point.

(3+6)

15. a) Explain the following costs with respect to an inventory.

i) Set up cost

ii) Carrying cost

iii) Shortage cost

b) Derive an expression for the minimum cost of maintaining an inventory with shortage under EOQ model

(3+6)
