



SG – 296

20

VI Semester B.Sc. Examination, September/October 2021
(CBCS) (F+R) (2019 – 20 and Onwards)
STATISTICS – VIII
Operations Research

Time : 3 Hours

Max. Marks : 70

Instructions : i) Answer **any five** questions from Section **A** and **five** questions from Section **B**.

ii) Scientific calculators are **permitted**.



SECTION – A (25 Marks)

I. Answer **any five** questions.

(5×5=25)

- 1) What is Operations Research (OR) model ? Describe various types of OR models.
- 2) Explain the characteristics of LPP.
- 3) What is an Assignment Problem (AP) ? Explain Hungarian's method of solving an AP.
- 4) What is a game problem ? Explain the following terms with reference to a game problem :
 - i) Two person zero sum game
 - ii) Strategy
 - iii) Pay-off
 - iv) Value of the game.
- 5) What is an EOQ model ? Derive an expression for the minimum cost of maintaining an inventory without shortages for an EOQ model.
- 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) Define a queueing problem. Distinguish between steady and transient states of queueing system.
- 8) Describe the queueing model : (M/M/1) : (N/FIFO). Also derive expressions for average expected waiting time of a customer in the system and in the queue.

P.T.O.



SECTION – B (45 Marks)

- II. Answer **any five** questions. (5×9=45)
- 9) a) What is OR ? Mention the areas of applications of OR.
 b) Explain the graphical method of solving a LPP. (4+5)
- 10) a) Explain basic variable, non-basic variable and unbasic solutions.
 b) Explain the criteria for the following :
 i) Optimality test
 ii) Entering variable
 iii) Leaving variable
 iv) Unbounded solution
 v) Multiple solution
 vi) Infeasible solution. (3+6)
- 11) a) Explain the Big-M method of finding a solution to a LPP.
 b) Write the duality for the LPP :
 Maximize $Z = 8x_1 + 6x_2$
 Subject to the constraints :
 $x_1 - x_2 \leq \frac{3}{5}$
 $x_1 - x_2 \geq 2$
 and $(x_1, x_2) \geq 0$. (5+4)
- 12) a) Give the mathematical formulation of assignment problem.
 b) Explain the MODI method of finding an optimal solution to a Transportation Problem (TP). (3+6)
- 13) a) Explain North-West corner cell method of finding IFBS to a T.P.
 b) State and prove necessary and sufficient conditions for the existence of a feasible solution to a T.P. (4+5)
- 14) a) Explain the Maximin-Minimax principle of solving a game problem.
 b) Derive expressions for optimal mixed strategies of a (2×2) game problem without a saddle point. (4+5)
- 15) a) Explain individual and group replacement policies.
 b) What is an inventory ? Explain the costs associated with inventories. (4+5)
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