M.Sc. Examination, 2018
Semester-III
Statistics
Course : MSC-33

(MSE-I Operations Research and Optimization Technique)

Time : 3 Hours **Full Marks : 40**

Questions are of value as indicated in the margin

Answer **any four** questions

1. What is an assignment problem? How is it different from traveling salesman problem? Show that if a constant be added to any row and/or any column of the cost matrix of an assignment problem, then the resulting assignment problem has the same optimal solution as the original problem. 3+3+4=10
2. For M/M/c queuing system find the expected number of customers in the system in the steady state and also the expected queue length. Find the cumulative distribution function for the waiting time of a customer who has to wait in a M/M/c queuing system. 5+5=10
3. Briefly describe the phases in Operations Research study. What do you mean by models in OR? Discuss the different types of models that are usually encountered in OR. 3+2+5=10
4. What is two-person zero-sum game? Transform this game to a Linear Programming Problem. Prove that the value of a two-person zero-sum game is unique. 2+3+5=10
5. a) Define an inventory. What are the advantages and disadvantages of having inventories?

   b) In a manufacturing situation the production is instantaneous and demand is D units per year. If no shortage is allowed, show that the optimal manufacturing quantity per run is

   $q = \sqrt{2C_p D / C_h(1 - D/K)}$, where C_p = set-up cost per run,

   C_h = holding cost per unit per year, K= manufacturing rate per unit of time (K > R). 4+6=10
6. What is replacement? Describe some important replacement situations. Discuss replacement policy of equipment that deteriorates gradually with (i) no change in time value of money and (ii) change in time value of money. 1+2+4+3=10
7. Write short notes on **any two** of the following : 5+5=10

   a) (s, S) inventory policy

   b) Duality problem in LPP

   c) Graphical solution of game problem

   d) Queue discipline
