SM – 379

Sixth Semester B.Sc. Examination, May/June 2018
(CBCS) (Fresh + Repeaters) (2016-17 and Onwards)
STATISTICS – VII
Applied Statistics – 2

Time : 3 Hours | Max. Marks : 70

Instructions : 1) *Answer* ***five*** *questions from Section –* ***A*** *and* ***five*** *questions from Section –* ***B***.
2) *Scientific calculators are* ***permitted***.

SECTION – A **25**

I. Answer **any five** questions from the following : **(5×5=25)**

1) What is hazard rate ? If h(t) is hazard rate of a component at time t, show that the reliability at time t is, $R(t) = \exp\left(-\int h(s)ds\right)$.

2) Prove that hazard rate of a component is constant if and only if its life distribution is exponential.

3) Explain the terms :
   i) Raw scores
   ii) Z-scores
   iii) Standard scores
   iv) Normalized scores
   v) Percentile scores.

4) Explain :
   i) Randomized control studies.
   ii) Prospective studies and Retrospective studies.

5) a) What is meant by odds ratio ? Interpret it and write 99% confidence interval for odds ratio.

   b) The Body Mass Index (BMI) of an individual is
      i) 25
      ii) 30
      Interpret these values.

P.T.O.

6) Define price elasticity of demand and supply. If the price elasticity is constant, find
   i) demand function
   ii) supply function.

7) Define :
   i) Utility
   ii) Utility function
   iii) Total utility
   iv) Marginal utility.

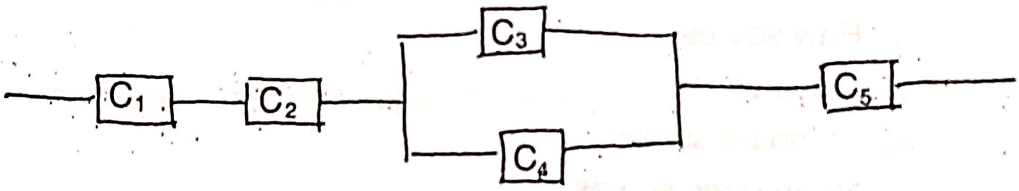
8) What is National Income ? Explain the methods of computing National Income.

SECTION – B **45**

II. Answer **any five** questions from the following : **(5×9=45)**

9) a) Define system reliability and obtain the reliability of a system of 'n' independent components connected in parallel.

   b) Write the structure function and find the reliability of the system given below : **(5+4)**



10) a) Explain the construction of T-scores and Percentile scores for a given frequency distribution.

   b) Explain the method of scaling of ranking in terms of Normal Probability curve. **(5+4)**

11) a) Define the following measurements of potential impact :
   i) Attributable risk.
   ii) Population attributable risk.
   iii) Attributable fraction in exposed.

   b) What is Receiver Operating Characteristics (R.O.C.) curve ? Explain the construction and use of ROC curve. **(4+5)**

12) a) Describe Lorenz curve and its construction.

b) State Pareto's law of income distribution and its significance. **(5+4)**

13) a) What is equilibrium price ? Find equilibrium price and quantity exchanged if demand and supply curve are :

$D = 19 - 3P - P^2$ and $S = 5P - 1$.

b) If $U = 3X^2 Y^2 + Y^2$ is the utility function, find marginal utility of commodity X and Y. Also prove that, the rate of change of marginal utility of X with respect to Y is equal to the rate of change of marginal utility of Y with respect to X. **(4+5)**

14) a) Describe the development of statistical system in Indian during

i) Pre-independent era.

ii) Post-independent era.

b) Write a note on Central Statistics Office (C.S.O.) and its activities. **(5+4)**

15) a) Discuss the organization of National Sample Survey Office (N.S.S.O.) and its functions.

b) Differentiate between G.D.P., G.N.P. and N.N.P. **(5+4)**

SM – 380

Sixth Semester B.Sc. Examination, May/June 2018
(CBCS) (F + R) (2016-17 and Onwards)
STATISTICS – VIII
Operations Research

Time : 3 Hours Max. Marks : 70

Instructions : *i) Answer **five** questions from Section – **A** and **five** questions from Section – **B**.*
*ii) Scientific **calculators** are allowed.*

SECTION – A **(25 Marks)**

I. Answer **any five** questions from the following : **(5×5=25)**

1) What is operations research (OR) ? Mention various models of O.R.

2) Describe a linear programming problem (L.P.P.) and write the L.P.P. in general form. Give a sketch of a graph showing infeasible solution to an L.P.P.

3) Describe a competitive game problem and state the properties of a game problem.

4) Explain with reference to inventory problem :
   i) Stock replenishment
   ii) Lead time
   iii) Buffer stock
   iv) Re-Order Level (ROL).

5) a) Define traffic intensity in queuing theory. How do you interpret its value ?
   b) Write a note on customer behavior.

6) With usual notations, derive the expressions for the following operating characteristics in (M | M | 1) : (FIFO | ∞ | ∞) ;
   i) Average queue length (Lq)
   ii) Average waiting time in the queue (Wq).

7) Mention the two approaches of solving a network problem and discuss their salient features.

8) Explain the method of finding the probability of completion of a project on scheduled time using PERT.

P.T.O.

SECTION – B

(45 Marks)

II. Answer **any five** questions from the following : **(5×9=45)**

9) a) Explain the graphical method of solving an L.P.P.

b) What is unbalanced transportation problem ? How of you address this ? **(5+4)**

10) a) What are artificial variables ? Give examples. Explain Charle's Big-M method.

b) Describe an assignment problem. Give its mathematical formulation. **(5+4)**

11) a) State and prove necessary and sufficient conditions for the existence of a feasible solution to a transportation problem.

b) Explain Hungarian algorithm of solving an assignment problem. **(5+4)**

12) a) Obtain the optimal strategies and the value of two-person zero-sum game without saddle point.

b) Explain the graphical method of solving (m × 2) game. **(5+4)**

13) a) What is inventory ? Explain the need for maintaining inventory.

b) What is replacement problem ? Obtain an optimum replacement policy for replacing items which deteriorate with time. **(4+5)**

14) a) Obtain an expression for EOQ in an inventory model without shortages.

b) State group replacement policy and discuss. **(5+4)**

15) a) What is a network ? Explain its basic components.

b) Describe time estimates in PERT. **(5+4)**