Exam. Code : 103201
Subject Code : 1034

B.A./B.Sc. 1st Semester (Batch 2021-24)
QUANTITATIVE TECHNIQUES
(Quantitative Techniques—I)

Time Allowed—3 Hours] [Maximum Marks—100

Note :— Attempt ***five*** questions in all, selecting at least ***one*** question from each section. The **fifth** question may be attempted from any section. All questions carry equal marks.

SECTION—A

1. (i) Solve $\frac{xy}{x+y}=\frac{1}{9}, \frac{yz}{y+z}=\frac{1}{11}$ and $\frac{zx}{z+x}=\frac{1}{10}$.

   (ii) Solve $\sqrt{x}+\frac{8}{\sqrt{x}}=6$.

   (iii) Demand and supply equations are given as $p^2 + q^2 = 20$ and $2p + q = 8$ respectively where p is the price and q is the quantity. Find equilibrium price and quantity. 6+7+7

2. (i) Insert 6 Arithmetic Means between 3 and 24.

   (ii) Which term of the series $1+\frac{1}{2}+\frac{1}{4}+\frac{1}{8}$..... is $\frac{1}{512}$.

   (iii) Find sum up to n terms of the series
   .7 + .77 + .777 ..... 6+7+7

SECTION—B

3. (i) Prove that $y = 5x - 7$ and $2y = 10x + 5$ are parallel.

   (ii) Find the equation of st. line which passes through (1, 3.5) and sum of its intercepts on the coordinates axes is 9.

   (iii) The demand for milk is given by :

Price Rs./litre	Demand in litres
1	100
2	50
3	0

   Find linear demand function. 7+7+6

4. (i) Define sets. Explain various types of sets.

   (ii) Explain union, intersection, difference and symmetric difference of sets.

   (iii) A class of 70 students, out of which 30 have Math and 20 have taken Math but not Statistics. Find no. of students who have taken Math and Statistics and those who have taken Statistics but not Math. 6+7+7

SECTION—C

5. (i) Explain the concept of function and various types of functions.

   (ii) Prove that $\lim\limits_{x \to 1} \dfrac{x^2 - 3x + 2}{x - 1} = -1$. 10+10

6. (i) Distinguish between a continuous function and discontinuous function.

   (ii) Prove that $\dfrac{x^2 + 1}{x^2 - 1}$ is continuous at $x = 2$.

10+10

SECTION—D

7. (i) Differentiate $(7x - 8)^4 (5x - 1)^3$ w.r.t. x.

   (ii) Find the derivative of $\dfrac{x + 2}{3 + \log x}$ w.r.t. x.

   (iii) Differentiate $5^{\sqrt{1+x^2}}$ w.r.t. x. 6+7+7

8. (i) Given the demand function $p = 50 - 3q$, find elasticity of demand $p = 5$.

   (ii) Prove that elasticity of demand $= \dfrac{AR}{AR - MR}$ where demand function is $p = 50 - 3x$ and $p = 5$.

   (iii) Given the total cost function $C = 60 - 12q + 2q^2$, find AC, MC and show that slope of $AC = \dfrac{1}{q}(MC - AC)$. 5+5+10