Exam. Code : 103201
Subject Code : 1037

B.A./B.Sc. 1st Semester

QUANTITATIVE TECHNIQUES—I

Time Allowed—3 Hours]   [Maximum Marks—100

Note :— First question consisting of **10** short answer questions (carrying **2** marks each) is compulsory. Attempt *one* out of *two* questions from each of the four units (20 = 10 + 10 marks each).

1. Attempt **all** parts of this question :

   (i) Solve :
   $$2x - 3y = 1, \ 5x + 4y = 14.$$

   (ii) Solve :
   $$5\sqrt{4x^2 - 3} - \frac{2}{\sqrt{4x^2 - 3}} = 3.$$

   (iii) Find the sum of n terms of a GP series.

   (iv) Explain the concept of permutations.

   (v) Find t-ratios of 90°.

   (vi) Distinguish between constants and variables.

   (vii) Explain difference and symmetric difference of sets.

(viii) Find the derivative of log x by first principle method.

(ix) Prove that :

$$\tan\theta + \cot\theta = \sec\theta \csc\theta.$$

(x) Differentiate :

$$\sqrt{\frac{1-x}{2+x}} \text{ w.r.t. } x.$$

UNIT—1

2. (i) Solve :

(x − 1) (x + 1) (2x + 3) (2x − 1) = 3.

(ii) Solve :

$x + y = 5, x^2 + 2y^2 = 17.$

3. (i) The sum of three numbers in AP is 15 and sum of their squares is 83. Find the numbers.

(ii) Find the sum of n terms of the series :

3 + 33 + 333 + ...

UNIT—2

4. (i) Find the equation of the straight line passing through the points (3, 4) and (6, 7). Find the coordinates of the points where it meets the axes. Also find portion of the line intercepted between the axes.

(ii) Prove that :

sin 75° − sin 15° = cos 105° + cos 15°.

5. (i) A town has a population of 60000. Out of it 32000 read The Hindustan Times and 35000 read Times of India newspaper, while 7500 read both the papers. How many read neither The Hindustan Time nor Times of India.

(ii) Prove :

$$A \cap (B \cup C) = (A \cap B) \cup (A \cap C) \text{ and}$$
$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$

UNIT—3

6. (i) Find limit of the function $\dfrac{e^x - 1}{x}$ as x tends to zero.

(ii) Find the limit :

$$\lim_{x \to \infty} \frac{6x^2 + 2x + 1}{6x^2 - 3x + 1}.$$

7. (i) Explain the concept of function. Discuss demand function, supply function, cost function and revenue function.

(ii) Find domain and range of the function :

$$y = \frac{x+1}{2x+1}.$$

UNIT—4

8. (i) If $y = \sqrt{\dfrac{1-x}{1+x}}$, prove that :

$$(1 - x^2) \frac{dy}{dx} + y = 0.$$

(ii) Find $\dfrac{dy}{dx}$ when $x^y + y^x = a^b$ where a and b are constants.

9. (i) If the demand law is $q = \dfrac{20}{p+1}$, find elasticity of demand at $p = 4$.

(ii) Given the revenue function $R = 14x - x^2$ and cost function $T = x(x^2 - 2)$ find AR, MR, AC and MC.