Exam. Code : 103201
Subject Code : 1034

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

QUANTITATIVE TECHNIQUES

(Quantitative Techniques—I)

Time Allowed—3 Hours] [Maximum Marks—100

Note :— There are ***eight*** questions. Candidates are required to attempt any ***five*** questions. All questions carry equal marks.

SECTION—A

1. (a) What are simultaneous Linear Equations ? Solve :

$$\frac{x-y}{x+3}=\frac{y-1}{4} \text{ and } \frac{4x-5y}{7}=x-7.$$

(b) Find the equilibrium price and quantity of demand and supply laws given as follows :

$3p + 2q = 16,\ 5p - 3q = 14.$

(c) What are quadratic equations ? Solve :

$(x+2)(x-5)(x-6)(x+6)$. 10+5+5=20

2. (a) Differentiate between A.P series and G.P series.

(b) How many terms of the series 9 + 12 + 15..... will make the sum 225 ?

(c) The third term of a GP is 4.5 and the ninth term is 16.2. Find the first term and the common ratio.

(d) If you save 1 paisa today, 2 paise next day and 3 paise the succeeding day and so on, what will be your savings in 365 days ? 5+5+5+5=20

SECTION—B

3. (a) Derive the equation of straight line passing a given point (x_1, y_1) and whose slope is m. Find the equation of straight line passing through the point (4, 5) and make an intercept of 3 units with x-axis.

   (b) (i) What is the symmetric difference of two sets ? If A = {1, 3, 7, 4}, B = {6, 7, 8, 9}. Find A Δ B.

   (ii) Discuss :

   (1) union of two sets and

   (2) complement of two sets with the help of example.

   (c) Explain the concept of permutation with the help of example. 5+10+5=20

4. (a) Find the equation of straight line passing through the point (–1, 3) and has the slope 2.

   (b) Find the equation of straight line which cuts off intercept 4 and 5 on the x-axis and y-axis respectively.

   (c) Discuss the intersection of two sets and difference of two sets with the help of examples.

   (d) Explain the concept of combination with the help of an example. 5+5+5+5=20

SECTION—C

5. (a) Explain the term function. Differentiate between explicit and implicit functions.

   (b) Evaluate $\lim_{x \to 2} \frac{x^3 - 8}{x - 2}$ by method of substitution.

   (c) Write and interpret the supply function with its specific form.

   (d) Differentiate x^2 by using ab-initio principle.

   5+5+5+5=20

6. (a) Explain the graph of linear and quadratic functions with the help of examples.

   (b) Differentiate between constant and variable.

   (c) Show that $f(x) = \frac{x^2 + 1}{x - 1}$ is continuous at $x = 2$.

   (d) Differentiate w.r.t. x from first principle : $y = 3x + 4$.

   5+5+5+5=20

SECTION—D

7. (a) Discuss the power function and quotient rules of differentiation.

   (b) Find $\frac{dy}{dx}$ when $x = \frac{3at}{1+t^3}, y = \frac{3at^2}{1+t^3}$.

   (c) Differentiate w.r.t. x : $y = \frac{\log x}{x}$

   (d) The demand curve of monopolist is given by $x = 100 - 4p$. Find TR, AR and MR.

   5+5+5+5=20

8. (a) Find dy/dx of the given function :

$$x^2 + 2xy + y^2 = 4.$$

(b) Find dy/dx ; $y = \frac{3}{4+6e^{3x}}$.

(c) Discuss the sum and product rules of differentiation.

(d) Give the demand function $q = 100 - 2p - 2p^2$. Calculate the price elasticity of demand when $p = 10$. 5+5+4+6=20