

Exam. Code : 103201

Subject Code : 1035

B.A./B.Sc. Ist Semester

QUANTITATIVE TECHNIQUES—I

Time Allowed—3 Hours]

[Maximum Marks—100

- Note** :—(1) Attempt all parts of Q. 1. Each part carries 2 marks.
- (2) Attempt **ONE** out of **TWO** questions from each of the **four** Units. Each question carries 20 marks.
- (3) Use of simple (None-scientific) calculators is allowed.

1. Give brief answers to the following :

- (a) Given $f(x) = 5x^3 - 2x^2 + 3x - 8$, find $f(-3)$.
- (b) Find roots of the equation $5x^2 - 55x + 140 = 0$.
- (c) Formulae for finding the sum and sum of squares of the first n natural numbers.
- (d) If $A \subset B$ then $A \cap B = ?$
- (e) Formula for distance between two points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$.
- (f) If ${}^{15}C_r = {}^{15}C_{r+3}$, then what is the value for r ?
- (g) Find dy/dx , if $y = x(x - 2)^{2/3}$.

(h) How many different words can be generated with the letters of 'AMRITSAR' ?

(i) Conceptual meaning of function of a variable.

(j) Graphical shape of the equation : $2y - x - 1 = 0$.

$$2 \times 10 = 20$$

UNIT—I

2. (a) Find equation of a quadratic equation, each of the roots of which are 2 more than the roots of $3x^2 - 41x + 26 = 0$. 10

(b) The first term of a series in G.P. is 4. If the sum of the 3rd and the 5th terms is 360, what must be common ratio of the series ? 10

3. (a) Find the equilibrium price and quantity for the following market :

$$Q_d = 125 - 2P; Q_s = -45 + 8P. \quad 10$$

(b) The fourth term of a series in arithmetic progression is 34 and the sum of its first six terms is 210. Then which term of the series equals zero ? 10

UNIT—II

4. (a) In a class of 50, 12 students have taken Economics, 8 have taken Economics but not History. Find the number of students who have taken Economics and History, and those who have taken History but not Economics. 10

(b) Find the point of intersection of $3x - 2y = 4$ and $x - 2y = 2$. 10

5. (a) Taking Ω as the set of first six letters of English alphabet, and defining other sets A and B as :

$A = \{a, b, c\}$ and $B = \{b, c, d, e\}$, verify that

(i) $(A \cap B)' = A' \cup B'$, and

(ii) $(A \cup B)' = A' \cap B'$. 10

- (b) Show that :

$$\left(1 + \frac{1}{\tan^2 \theta}\right) \left(1 + \frac{1}{\cot^2 \theta}\right) = \frac{1}{\sin^2 \theta - \sin^4 \theta}. \quad 10$$

UNIT—III

6. (a) Evaluate

$$\lim_{x \rightarrow 0} \frac{e^x - e^{-x}}{x}. \quad 5$$

- (b) Sketch the graph of the function $y = x^2 - 5x + 3$, $0 < x < 6$ and graphically examine the point where y attains the minimum value. 15

7. (a) Give the concept of continuity of a function. How is continuity related with limiting value of the function? 8

- (b) What do you understand by derivative of a function? Differentiate w.r.t. x :

$$y = \frac{1}{\sqrt[3]{e^{-x^2} + e^{x^2}}}. \quad 12$$

UNIT—IV

8. (a) Give rules of differentiation of a function. 8
(b) Differentiate $y = 2/x^3$ from the *ab-initio* principle. 12
9. (a) If $y = x^3$ and $x = z^2 + 4$, find $\frac{dy}{dz}$. 10
(b) Find $\frac{dy}{dx}$, if $(x + y)^{p+q} = x^p y^q$. 10