

Students will not be allowed to write during the first 15 minutes.

This time is to be spent in reading the question paper.

The time given at the head of this Paper is the time allowed for writing the answers.

Attempt all questions from Section A and any four questions from Section B.

All working, including rough work, must be clearly shown and must be done on the same sheet as the rest of the answer.

Omission of essential working will result in loss of marks.

The intended marks for questions or parts of questions are given in brackets [ ].

**SECTION A (40 Marks)**

(Attempt all questions from this Section)

**Question.1 : Choose the correct answer from the given four options.**

[15]

i)  $\sqrt{10} \times \sqrt{15}$  is equal to

(a)  $6\sqrt{5}$

(b)  $5\sqrt{6}$

(c)  $\sqrt{25}$

(d)  $10\sqrt{5}$

ii) If  $x^2 + y^2 = 9$  and  $xy = 8$ , then  $x + y$  is equal to

(a) 25

(b) 5

(c) -5

(d)  $\pm 5$

iii) If  $a + b + c = 0$ , then the value of  $a^3 + b^3 + c^3$  is

a) 0

b)  $abc$

c)  $2abc$

d)  $3abc$

iv) Factorisation of  $16x^2 + 40x + 25$  is

(a)  $(4x + 5)(4x + 5)$

(b)  $(4x + 5)(4x - 5)$

(c)  $(4x - 5)(4x - 5)$

(d)  $(4x + 5)(4x + 7)$

v) If 2 is a root of the quadratic equation  $2x^2 - kx + 1 = 0$ , then the value of  $k$  is

(a) 9

(b) -9

(c)  $\frac{9}{2}$

(d)  $-\frac{9}{2}$

vi) The value of  $\sqrt[4]{(81)^{-2}}$  is

(a)  $\frac{1}{9}$

(b)  $\frac{1}{3}$

(c) 9

(d)  $\frac{1}{81}$

vii) If  $a, b, c$  are the lengths of the sides of a triangle, then

(a)  $a - b > c$

(b)  $c > a + b$

(c)  $c = a + b$

(d)  $c < a + b$

viii) In  $\triangle ABC$ ,  $AB = 3$  cm,  $BC = 4$  cm and  $CA = 5$  cm. If  $D$  and  $E$  are mid-points of  $AB$  and  $BC$  respectively, then the length of  $DE$  is

- (a) 1.5 cm                      (b) 2 cm                      (c) 2.5 cm                      (d) 3.5 cm

ix) If the sides of a rectangular plot are 15 m and 8 m, then the length of its diagonal is

- (a) 17 m                      (b) 23 m                      (c) 21 m                      (d) 17 cm

x) The distance between the points  $A(0, 6)$  and  $B(0, -2)$  is

- a) 6 units                      b) 8 units                      c) 4 units                      d) 2 units

xi) The distance between the points  $(4, p)$  and  $(1, 0)$  is 5 units, then the value of  $p$  is

- a) 4 only                      b) -4 only                      c)  $\pm 4$                       d) 0

xii) The value of  $(256)^{0.16} \times (256)^{0.09}$  is

- a) 4                      b) 16                      c) 64                      d) 256.25

xiii) Which of the following quadratic equation has  $(-1)$  as a root?

- a)  $x^2 + 5x + 6 = 0$                       b)  $2x^2 - 3x + 1 = 0$                       c)  $2x^2 + x - 3 = 0$                       d)  $2x^2 - x - 3 = 0$

xiv) Factorisation of  $p^4 - 81$  is

- a)  $(p^2 - 9)(p^2 + 9)$                       b)  $(p^2 - 9)(p^2 - 9)$                       c)  $(p - 3)^2(p + 3)^2$                       d) none of these

xv) Which of the following is not a criterion for congruency of triangles?

- a) SAS                      b) ASA                      c) SSA                      d) SSS

### Question 2 :

a) Plot the points  $A(1, 2)$ ,  $B(-4, 2)$ ,  $C(-4, -1)$  and  $D(1, -1)$ . What kind of quadrilateral is  $ABCD$ ? Also find the area of the quadrilateral  $ABCD$ . [4]

b) Given  $1176 = 2^p \cdot 3^q \cdot 7^r$ , find :-

i) the numerical values of  $p, q$  and  $r$

ii) the value of  $2^p \cdot 3^q \cdot 7^{-r}$  as a fraction. [4]

c) Foot of 10 m long ladder leaning against a vertical wall is 6 m away from the base of the wall. Find the height of the point on the wall where the top of the ladder reaches. [4]

### Question 3:

a) If  $x + \frac{1}{x} = 4$ , find the values of :- i)  $x^2 + \frac{1}{x^2}$ , ii)  $x^4 + \frac{1}{x^4}$  [4]

b) The population of a city increase each year by 4% of what it had been at the beginning of each year. If its present population is 6760000, find its population 2 years hence. [4]

c) Simplify:  $\frac{7\sqrt{3}}{\sqrt{10+\sqrt{3}}} - \frac{2\sqrt{5}}{\sqrt{6+\sqrt{5}}} - \frac{3\sqrt{2}}{\sqrt{15+3\sqrt{2}}}$  [5]

**SECTION B (40 Marks)**

(Attempt any four questions from this Section)

**Question 1:** a) If  $a + b + c = 0$ , then find the value of  $\frac{a^2}{bc} + \frac{b^2}{ca} + \frac{c^2}{ab}$ . [3]

b) If  $a = 1$ ,  $b = (-2)$  and  $c = (-3)$ , find the value of  $\frac{a^3 + b^3 + c^3 - 3abc}{ab + cb + ca - (a^2 + b^2 + c^2)}$  [3]

c) Factorise the following:- (i)  $\pi a^5 - \pi^3 ab^2$ . (ii)  $y^2 - yz - 5y + 5z$  [4]

**Question 2:** a) Solve :-  $\frac{x+3}{x-1} = \frac{2x+1}{3x-5}$ . [3]

b) Simplify :-  $\left(\frac{1}{4}\right)^{-2} - 3(8)^{\frac{2}{3}}(4)^0 + \left(\frac{9}{16}\right)^{-\frac{1}{2}}$ . [3]

c) If  $abc = 1$ , show that  $\frac{1}{1+a+b^{-1}} + \frac{1}{1+b+c^{-1}} + \frac{1}{1+c+a^{-1}} = 1$ . [4]

**Question 3:** a) In  $\triangle ABC$ ,  $AB = AC$ ,  $\angle A = (5x + 20)^\circ$  and each of the base angle is  $\frac{2}{5}$ th of  $\angle A$ . Find the measure of  $\angle A$ . [3]

b) Show that the angles of an equilateral triangle are  $60^\circ$  each. [3]

c) If D, E and F are mid-points of the sides AB, BC and CA respectively of an isosceles triangle ABC, prove that  $\triangle DEF$  is also isosceles. [4]

**Question 4:** a) Two poles of heights 6 m and 11 m stand on a plane ground. If the distance between their feet is 12 m, find the distance between their tops. [3]

b) If the point A(2, -4) is equidistant from the points P(3, 8) and Q(-10, y), find the values of y. Also find distance PQ. [3]

c) Using distance formula, show that the points A(3, 1), B(6, 4) and C(8, 6) are collinear. [4]

**Question 5:** a) If  $a = 5 + 2\sqrt{6}$ , then find the value of  $a^2 + \frac{1}{a^2}$ . [3]

b) Express  $1.\overline{32} + 0.\overline{35}$  in the form of  $\frac{p}{q}$ , where p and q are integers and  $q \neq 0$ . [3]

c) In a factory, the production of motorbikes rose to 23328 from 20000 in 2 years. Find the rate of growth of the production of motorbikes. [4]

**Question .6:** a) If  $x^2 + \frac{1}{x^2} = 7$ , find the values of: -

(i)  $x + \frac{1}{x}$

(ii)  $x - \frac{1}{x}$

(iii)  $2x^2 - \frac{2}{x^2}$

b) Solve :- (i)  $6x + 29 = \frac{5}{x}$ , (ii)  $\frac{x}{3} + \frac{9}{x} = 4$ . [3]

c) If  $P = \frac{\sqrt{5} - \sqrt{3}}{\sqrt{5} + \sqrt{3}}$  and  $q = \frac{\sqrt{5} + \sqrt{3}}{\sqrt{5} - \sqrt{3}}$  find the value of  $(p^2 + q^2)$ . [4]

**Question.7:** a) Find the value of k if the point P(2, 4) is equidistant from the point A(5, k) and B(k, 7) [3]

b) The perpendicular distance of a point from the x-axis is 4 units and the perpendicular distance from y-axis is 5 units. Write the coordinates of such a point if it lies in the,

i) 1st quadrant, ii) 2nd quadrant, iii) 3rd quadrant. [3]

c) Three vertices of a square are A(2, 3), B(-3, 3) and C(-3, -2). Plot these points on a graph paper and hence, use it to find the coordinates of the fourth vertex. Also find the area of the square. [4]