



ST. JOSEPH'S COLLEGE, PRAYAGRAJ
HALF YEARLY EXAM – OCTOBER 2023
MATHEMATICS

Time: 2½ Hrs.

CLASS IX

M.M.: 80

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

Section-A (40 Marks)

Q.1

(15×1=15)

i. If $x+y=1$ and $x-y=7$, then the value of xy is

- (a) -15 (b) -12 (c) 12 (d) 15

ii. $\frac{3\sec 73^\circ}{2\operatorname{cosec} 17^\circ} =$

- (a) 2 (b) 3 (c) $\frac{2}{3}$ (d) $\frac{3}{2}$

iii. If $\log_x \frac{1}{49} = -2$, then x is equal to

- (a) 49 (b) 7 (c) $\frac{1}{7}$ (d) $\frac{1}{49}$

iv. If $\cos \theta = \frac{4}{5}$, then $\tan \theta$ is equal to

- (a) $\frac{3}{5}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{4}{3}$

v. Factorisation of $y(y-z) + 9(z-y)$ is

- (a) $(y-z)(y+9)$ (b) $(y-z)(y-9)$ (c) $(z-y)(y+9)$ (d) none of these

vi. The value of $\left(5\frac{1}{16}\right)^{-\frac{3}{4}}$ is-

- (a) $\frac{4}{9}$ (b) $\frac{9}{4}$ (c) $\frac{27}{8}$ (d) $\frac{8}{27}$

vii. If $\log_5(0.04) = x$, then the value of x is

- (a) 2 (b) 4 (c) -4 (d) -2

viii. The value of $(\sin 45^\circ + \cos 45^\circ)$ is

- (a) $\frac{1}{\sqrt{2}}$ (b) $\sqrt{2}$ (c) $\frac{\sqrt{3}}{2}$ (d) 1

ix. The value of $\frac{1 - \tan^2 45}{1 + \tan^2 45}$ is equal to

- (a) $\tan 60^\circ$ (b) $\tan 30^\circ$ (c) $\sin 45^\circ$ (d) $\tan 0^\circ$

x. $\sqrt{450}$ when expressed as mixed surd is

- (a) $15\sqrt{2}$ (b) $2\sqrt{15}$ (c) $-15\sqrt{2}$ (d) none of these

xi. If $p^2 + \frac{1}{p^2} = 23$, then the value of $p + \frac{1}{p}$ is

- (a) 2 (b) ± 5 (c) ± 4 (d) none of these

xii. If $a+b=4$ and $a^3+b^3=52$, then value of 'a b' is

- (a) -1 (b) 1 (c) 4 (d) none of these.

xiii. If $\cos 3B = \frac{1}{\sqrt{2}}$, then B is

- (a) 0° (b) 30° (c) 15° (d) none of these

xiv. One of the factors of $(x-1) - (x^2-1)$ is

- (a) x^2-1 (b) $x+1$ (c) $x-1$ (d) $x+4$

xv. In the following question, a statement of assertion (A) is followed by a statement of reason (R). Read the given statement carefully and choose the correct option:

Assertion : $-\frac{2}{7}$ is a rational number

Reason: Any number that can be expressed in the form $\frac{p}{q}$ is a rational number.

- (a) Both assertion and reason are true and reason is the correct explanation of assertion.
(b) Both assertion and reason are true and reason is not the correct explanation of assertion.
(c) Assertion is true but reason is false.
(d) Assertion is false but reason is true.

Q.2 (i) If $x + \frac{1}{x} = 4$, find the values of (4)

(a) $x^2 + \frac{1}{x^2}$ (b) $x^4 + \frac{1}{x^4}$ (c) $x^3 + \frac{1}{x^3}$ (d) $x - \frac{1}{x}$

(ii) Factorise (4)

$$3-5a-5b-12(a+b)^2$$

(iii) Prove that $\frac{3^{2(a+6)} \times (9)^{-7+2a}}{(27)^{2a}} = \frac{1}{9}$ (4)

Q.3 (i) Factorise (4)

$$\frac{8}{27}x^3 - \frac{1}{8}y^3$$

(ii) Solve $\frac{x+1}{2} + \frac{y-1}{3} = 8$ (4)

$$\frac{x-1}{3} + \frac{y+1}{2} = 9$$

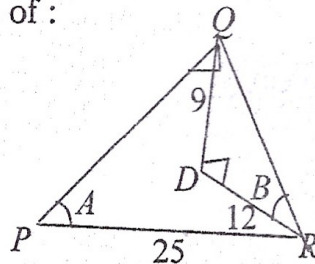
(iii) From the given figure, find the values of : (5)

(1) $2 \sin B - \cos B$

(2) $2 \sin A - \cos A$

(3) $1 - \sin A + \cos B$

(4) $2 \cos a - 3 \sin B + 4 \tan A$



Section-B (40 Marks) Any four

Q.4 (i) Simplify (3)

$$\frac{(32)^{\frac{2}{5}} \times (4)^{-\frac{1}{2}} \times (8)^{\frac{1}{3}}}{2^{-2} \div (64)^{-\frac{1}{3}}}$$

(ii) Evaluate $2 \log 5 + \log 3 + 3 \log 2 - \frac{1}{2} \log 36 - 2 \log 10$ (3)

(iii) Solve $\begin{matrix} 2x + y = 5 \\ 3x + 2y = 8 \end{matrix}$ by cross multiplication method. (4)

Q.5 (i) Solve $2x - \frac{1}{x} = 1$ (3)

(ii) If $\log(m+n) = \log m + \log n$, show that $n = \frac{m}{m-1}$ (3)

(iii) Solve for x (4)

$$4^{x-1} \times (0.5)^{3-2x} = \left(\frac{1}{8}\right)^x$$

Q.6 (i) Calculate the amount and the compound interest on ₹ 6000 at 10% p.a. for 1½ years, when the interest is compounded half yearly.

(3)

(ii) Express the given recurring decimal as rational number $0.7\overline{43}$

(iii) On what sum of money will the difference between simple interest and compound interest for 2 years at 4% per annum be equal to ₹ 20?

(4)

Q.7 (i) Factorise $25(x+y)^2 - (2x+y)^2$ (3)

(ii) Prove that $4(\sin^4 30^\circ + \cos^4 60^\circ) - 3(\cos^2 45^\circ - \sin^2 90^\circ) = 2$ (3)

(iii) Evaluate without using trigonometric tables. (4)

$$2\left(\frac{\tan 35^\circ}{\cot 55^\circ}\right)^2 + \left(\frac{\cot 55^\circ}{\tan 35^\circ}\right)^2 - 3\left(\frac{\sec 40^\circ}{\operatorname{cosec} 50^\circ}\right)$$
 (4)

Q.8 (i) Prove that $\sqrt{3}$ is an irrational number. (3)

(ii) Simplify $(4x+3y)^2 - (4x-3y)^2 - 48xy$ (3)

(iii) If, p, q are rational numbers and $p - \sqrt{15}q = \frac{2\sqrt{3} - \sqrt{5}}{4\sqrt{3} - 3\sqrt{5}}$, (4)

find the values of p and q.

*****ALL THE BEST*****