RACE # 23 MATHEMATICS

TIME : 45 Min. M.M. : 35

SECTION–I(i)

Straight Objective Type (3 Marks each, –1 for wrong answer)

1. If both roots of $x^2 + px + q = 0$ are positive and one root is cube of other root, then -

(A) $q^3 - 2q^2 - p^3 + 4p + q = 0$ (B) $q^3 - 2q^2 - p^4 + 4p^2q + q = 0$

(C) $q^3 - 2q^2 - p^2 - 4pq + q = 0$ (D) $q^3 - 2q^2 - p^3 - 4pq + q = 0$

2. If α and β are solutions of $x^2 - 10x + 10 = 0$ such that $\frac{\alpha}{\beta} + \frac{\beta}{\alpha} = b$, then roots of equation $2x^2 + 10x + 3b = 0$ are

(A) rational and distinct (B) real and equal

(C) imaginary (D) irrational and distinct

3. A right triangle has perimeter of length 7 and hypotenuse of length 3. If θ is the largest non right angle in the triangle, then the value of $\cos\theta$ equals-

(A) $\frac{\sqrt{6}-\sqrt{2}}{4}$ (B) $\frac{4+\sqrt{2}}{6}$ (C) $\frac{4-\sqrt{2}}{3}$ (D) $\frac{4-\sqrt{2}}{6}$

SECTION–I(ii)

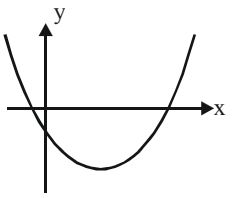
Multiple Correct Answer Type (4 Marks each, –1 for wrong answer)

4. Number of real value(s) of c for which system of equations $x^2 + cx - 1 = 0$ and $cx^2 + x - 1 = 0$ have

(A) a common root, is 1 (B) two common roots, is 1

(C) exactly one common solution, is 1 (D) a common root, is 2.

5. If the graph of $y = ax^2 + bx + c$ is as shown in figure, then -



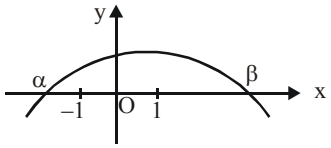
(A) $a > 0$

(B) $b < 0$

(C) $c < 0$

(D) $b^2 > 4ac$

6. The graph of quadratic polynomial $f(x) = ax^2 + bx + c$ is shown below.



Which of the following are correct ?

(A) $\frac{c}{a} < -1$ (B) $|\beta - \alpha| > 2$

(C) $f(x) > 0 \ \forall \ x \in (0,\beta)$ (D) $abc < 0$

SECTION–I(iii)

Linked Comprehension Type (Single Correct Answer Type) (3 Marks each, –1 for wrong answer)

Paragraph for Question 7 & 8

Let $f(x) = x^2 + 3x + 1$ and $g(x) = x + 1$.

7. Let $f(x) + \lambda g(x) > -10 \ \forall \ x \in R$, then sum of all possible integral values of λ is -

(A) –11 (B) –13 (C) 11 (D) 13

8. Range of $\frac{f(x)}{g(x)}$, $x \in R$ is -

(A) $(-\infty,-3]\cup[1,\infty)$ (B) $(-\infty,1]\cup[3,\infty)$ (C) $(-\infty,-1]\cup[3,\infty)$ (D) $(-\infty,\infty)$

SECTION–III(i)

Numerical Grid Type (Single digit Ranging from 0 to 9) (4 Marks each, –1 for wrong answer)

9. If α and β are roots of $x^2 - 21x + 4 = 0$ and $\frac{\sqrt{\alpha}}{\beta}, \frac{\sqrt{\beta}}{\alpha}$ are roots of $px^2 + qx + 2 = 0$, then value of of $(26p + q)$ is

10. Find the range of values of 'a' for which the system of equations

$x + ay = 3$ satisfy $x > 1$; $y > 0$

and $ax + 4y = 6$

SECTION-I	Q.	1	2	3	4	5	6	7	
	A.	D	D	B	D	B	A	B,C,D	
SECTION-III	Q.	8	9	10					
	A.	0	7	2					