CHAPTER 04 QUADRATIC EQUATIONS

SUBJECT: MATHEMATICS	**MAX. MARKS : 40**
CLASS : X	**DURATION : 1½ hrs**

General Instructions:
(i). **All** questions are compulsory.
(ii). This question paper contains 2**0** questions divided into five Sections A, B, C, D and E.
(iii). **Section A** comprises of **10 MCQs** of **1 mark** each. **Section B** comprises of 4 questions of **2 marks** each. **Section C** comprises of 3 questions of **3 marks** each. **Section D** comprises of 1 question of **5 marks** each and **Section E** comprises of 2 Case Study Based Questions of **4 marks** each.
(iv). There is no overall choice.
(v). Use of Calculators is not permitted

SECTION – A
Questions 1 to 10 carry 1 mark each.

1. If a and b are the roots of the equation $x^2 + ax - b = 0$, then find a and b.
   (a) $a = -1$ and $b = 2$ (b) $a = 1$ and $b = 2$
   (c) $a = -2$ and $b = 1$ (d) $a = 2$ and $b = -1$

2. Which of the following are the roots of the quadratic equation, $x^2 - 9x + 20 = 0$?
   (a) 3, 4   (b) 4, 5   (c) 5, 6   (d) 6, 7

3. If $(1 - p)$ is a root of the equation $x^2 + px + 1 - p = 0$, then roots are
   (a) 0, 1   (b) – 1, 1   (c) 0, – 1   (d) – 1, 2

4. Which of the following equations has two distinct real roots?
   (a) $2x^2 - 3\sqrt{2}\, x + \dfrac{9}{4} = 0$ (b) $x^2 + x - 5 = 0$
   (c) $x^2 + 3x + 2\sqrt{2} = 0$ (d) $5x^2 - 3x + 1 = 0$

5. Which of the following equations has no real roots ?
   (a) $x^2 - 4x + 3\sqrt{2} = 0$ (b) $x^2 + 4x - 3\sqrt{2} = 0$
   (c) $x^2 - 4x - 3\sqrt{2} = 0$ (d) $3x^2 + 4\sqrt{3}\, x + 4 = 0$

6. If the roots of $ax^2 + bx + c = 0$ are equal in magnitude but opposite in sign, then
   (a) $a = 0$ (b) $b = 0$ (c) $c = 0$ (d) none of these

7. If the roots of equation $3x^2 + 2x + (p + 2)(p - 1) = 0$ are of opposite sign then which of the following cannot be the value of p?
   (a) 0   (b) – 1   (c) $\dfrac{1}{2}$ (d) – 3

8. The value of k for which the equation $x^2 + 2(k + 1)x + k^2 = 0$ has equal roots is
   (a) – 1   (b) $-\dfrac{1}{2}$ (c) 1   (d) none of these

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of reason (R). Mark the correct choice as:
(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).
(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).
(c) Assertion (A) is true but reason (R) is false.
(d) Assertion (A) is false but reason (R) is true.

9. **Assertion (A):** If one root of the quadratic equation $6x^2 - x - k = 0$ is $\dfrac{2}{3}$, then the value of k is 2.

Reason (R): The quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has almost two roots.

10. **Assertion (A):** The roots of the quadratic equation $x^2 + 2x + 2 = 0$ are imaginary
Reason (R): If discriminant $D = b^2 - 4ac < 0$ then the roots of quadratic equation $ax^2 + bx + c = 0$ are not real i.e. imaginary.

SECTION – B
Questions 11 to 14 carry 2 marks each.

11. Solve for x : $4x^2 - 2(a^2 + b^2)\, x + a^2\, b^2 = 0$.

12. The sum of the squares of three consecutive positive integers is 50. Find the integers.

13. Find the value of α such that the quadratic equation $(\alpha - 12)x^2 + 2(\alpha - 12)x + 2 = 0$, has equal roots.

14. Find the value of p, for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.

SECTION – C
Questions 15 to 17 carry 3 marks each.

15. If -5 is a root of the quadratic equation $2x^2 + px - 15 = 0$ and the quadratic equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k.

16. If the equation $(1 + m^2)x^2 + 2mcx + c^2 - a^2 = 0$ has equal roots, then show that $c^2 = a^2(1 + m^2)$.

17. Solve the following for x : $\dfrac{1}{2a + b + 2x} = \dfrac{1}{2a} + \dfrac{1}{b} + \dfrac{1}{2x}$

SECTION – D
Questions 18 carry 5 marks.

18. In a flight of 600 km, an aircraft was slowed due to bad weather. Its average speed for the trip was reduced by 200 km/hr and time of flight increased by 30 minutes. Find the original duration of flight.

SECTION – E (Case Study Based Questions)
Questions 19 to 20 carry 4 marks each.

19. Raj and Ajay are very close friends. Both the families decide to go to Ranikhet by their own cars. Raj's car travels at a speed of x km/h while Ajay's car travels 5 km/h faster than Raj's car. Raj took 4 hours more than Ajay to complete he journey of 400 km.

(a) What will be the distance covered by Ajay's car in two hours? (1)

(b) Which of the following quadratic equation describe the speed of Raj's car? (2)

(c) What is the speed of Raj's car?　　(1)

20. John and Jivanti are playing with the marbles. They together have 45 marbles. Both of them lost 5 marbles each, and the product of the number of marbles they now have is 124.

(a) Find the quadratic equation related to the given problem (2)

(b) Find the Number of marbles John had. (2)