## SECTION A

*Following multiple choice questions are of **1 Mark** each (Q01-10).*
*Select the correct option in each one of them.*

Q01. It is given that $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $p(x) = x^2 - p(x+1) - c$, such that $(\alpha+1)(\beta+1) = 0$, then the value of c is

(A) 0 (B) 1 (C) $-1$ (D) 2

Q02. What should be added to the polynomial $f(x) = x^2 - 5x + 4$, so that 3 becomes a zero of the resulting polynomial?

(A) 1 (B) $-2$ (C) 4 (D) 2

Q03. The graph of a polynomial $p(x)$ passes through the points $(-5, 0)$, $(0, -40)$, $(8, 0)$ and $(5, -30)$, then which of the following is a factor of $p(x)$?

(A) $x^2 - 3x - 40$ (B) $x^2 - 13x - 40$ (C) $x^2 - 25$ (D) None of these

Q04. The number of real zeroes of the polynomial $293x^3 - 293$ is

(A) 0 (B) 1 (C) 2 (D) 3

Q05. If $\alpha$ and $\beta$ are the zeroes of the polynomial $p(s) = s^2 - as - b$, then the value of $(\alpha^2 + \beta^2)$ is

(A) $b^2 - 2a$ (B) $b^2 + 2a$ (C) $a^2 + ab$ (D) $a^2 + 2b$

Q06. If one zero of the quadratic polynomial $ax^2 + bx + c$ is double the other, then which of the following is true?

(A) $2b^2 = 9ac$ (B) $3b^2 = 2bc$ (C) $b^2 = 4ac$ (D) $2c^2 = 9ab$

Q07. The quadratic polynomial whose zeroes are $\frac{3+\sqrt{5}}{5}$ and $\frac{3-\sqrt{5}}{5}$, is

(A) $25x^2 - 30x + 4$ (B) $5x^2 - 6x + 4$ (C) $25x^2 - 30x + 20$ (D) $\frac{1}{5}(5x^2 + 6x + 4)$

Q08. If 2 and $\frac{1}{2}$ are the zeroes of $px^2 + 5x + r$, then

(A) $p = r = 2$ (B) $p = r = -2$ (C) $p = 2, r = -2$ (D) $p = -2, r = 2$

*Followings are **Assertion-Reason based questions** (Q09 & 10).*
In the following questions, a statement of Assertion (**A**) is followed by a statement of Reason (**R**).
Choose the correct answer out of the following choices.

(A) Both **A** and **R** are true and **R** is the correct explanation of **A**.
(B) Both **A** and **R** are true and **R** is not the correct explanation of **A**.
(C) **A** is true but **R** is false.
(D) **A** is false but **R** is true.

Q09. **Assertion (A) :** If a quadratic polynomial has equal zeroes, then its graph touches the x-axis at exactly one point.

**Reason (R) :** A quadratic polynomial represented by $ax^2 + bx + c$, $a \neq 0$ has equal zeroes, if and only if its discriminant $(b^2 - 4ac)$ is a non-negative and non-zero real number.

Q10. **Assertion (A) :** The graph of the quadratic polynomial $ax^2 + bx + c$ opens upwards, if $a > 0$.
**Reason (R) :** The sign of the coefficient 'a' in the quadratic polynomial determines the direction in which the parabola opens.

$[1 \times 10 = 10$

## SECTION B

*Followings are of **2 Marks** each (Q11-12).*

Q11. Find the zeroes of the polynomial $t^2 - 3t - m(m+3)$.

Q12. (a) If $(x-\alpha)$ is a factor of two quadratic polynomials $x^2+px+q$ and $x^2+mx+n$, then prove that $\alpha=\dfrac{n-q}{p-m}$.

**OR**

(b) If sum of the zeroes of $5x^2+(p+q+r)x+pqr$ is zero (0), then find the value of $p^3+q^3+r^3$.

$[2\times 2=4$

## SECTION C

*Followings are of **3 Marks** each (Q13-16).*

Q13. If $\alpha$ and $\beta$ are the zeroes of the polynomial $f(t)=t^2-3t-2$, then find a quadratic polynomial whose zeroes are $\left(\dfrac{1}{2\alpha+\beta}\right)$ and $\left(\dfrac{1}{2\beta+\alpha}\right)$.

Q14. If $\alpha$ and $\beta$ are the zeroes of $f(y)=2y^2+5y+k$ and they satisfy the relation $\alpha^2+\beta^2+\alpha\beta=\dfrac{21}{4}$, then find the value of $k$.

Q15. (a) If the squared difference of the zeroes of $g(t)=t^2+pt+45$ is $144$, then find the value (s) of $p$.

**OR**

(b) If $\alpha$ and $\beta$ are the zeroes of polynomial $25x^2-15x+12$, then find a quadratic polynomial whose zeroes are $\dfrac{1}{2\alpha}$ and $\dfrac{1}{2\beta}$.

Q16. If $\alpha$ and $\beta$ are the zeroes of the polynomial $x^2-6x+a$, find the value of a, if $3\alpha+2\beta=20$.

$[3\times 4=12$

## SECTION D

*Followings are of **5 Marks** each (Q17-18).*

Q17. If $\alpha$ and $\beta$ are the zeroes of the polynomial $f(x)=x^2-px+q$, prove that $\dfrac{\alpha^2}{\beta^2}+\dfrac{\beta^2}{\alpha^2}=\dfrac{p^4}{q^2}-\dfrac{4p^2}{q}+2$.

Q18. (a) If $\alpha$ and $\beta$ are the zeroes of the quadratic polynomial $f(x)=ax^2+bx+c$, then find the value of $a\left(\dfrac{\alpha^2}{\beta}+\dfrac{\beta^2}{\alpha}\right)+b\left(\dfrac{\alpha}{\beta}+\dfrac{\beta}{\alpha}\right)$.

**OR**

(b) If $\alpha$ and $\beta$ are the zeroes of quadratic polynomial $p(x)=6x^2+x-1$, then determine the value of $\dfrac{\alpha}{\beta}+\dfrac{\beta}{\alpha}+2\left(\dfrac{1}{\alpha}+\dfrac{1}{\beta}\right)+3\alpha\beta$.

$[5\times 2=10$

## SECTION E

*Following is a case-study based question of **4 Marks** (Q19); having three sub-parts (i), (ii) and (iii).*

Q19. A drone is sent on a surveillance mission along a straight road.

The diagram shown is for the representation purpose only.

The drone's height $h(t)$ in metres at time t seconds is given by the polynomial

$$h(t)=-5t^2+40t+100,$$

which represents the drone's height from the moment it starts vertically up from the base station at $t=0$, till it comes back down.

Based on the above information, answer the questions given below.

(i) Find the initial height of the drone.

(ii) At what time will the drone reach its maximum height?

(iii) (a) Factorize the polynomial $h(t) = -5t^2 + 40t + 100$ and hence find the time when the drone is at ground level.

**OR**

(b) Find the zeroes of the polynomial $h(t) = -5t^2 + 40t + 100$ and verify the relationship between the zeroes obtained and coefficients of the polynomial $h(t)$.

$[1 + 1 + 2 = 4$

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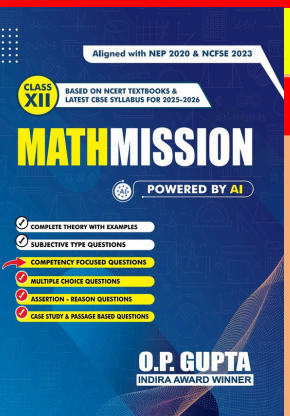


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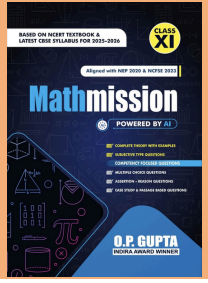


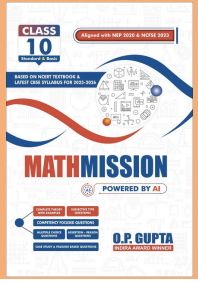


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