

THE O.P. GUPTA ADVANCED MATH CLASSES

Mathematics (Standard & Basic)

Topic - Polynomials

RTS-02



FOR ANSWERS

RANKERS
TEST SERIES FOR X

Max. Marks - 40

Time - 90 Minutes

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 α and β 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 α and β 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.

[1×10 = 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 $\alpha = \frac{n-q}{p-m}$.

OR

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

[2×2=4]

SECTION C

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

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

- Q14. If α and β are the zeroes of $f(y) = 2y^2 + 5y + k$ and they satisfy the relation $\alpha^2 + \beta^2 + \alpha\beta = \frac{21}{4}$, 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 α and β are the zeroes of polynomial $25x^2 - 15x + 12$, then find a quadratic polynomial whose zeroes are $\frac{1}{2\alpha}$ and $\frac{1}{2\beta}$.

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

[3×4=12]

SECTION D

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

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

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

OR

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

[5×2=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.

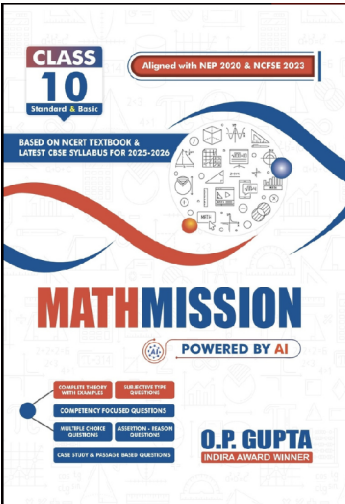
- (i) Find the initial height of the drone.
- (ii) At what time will the drone reach its maximum height?
- (iii) (a) Factorize the polynomial $h(t) = -5t^2 + 40t + 100$ and hence find the time when the drone is at ground level.

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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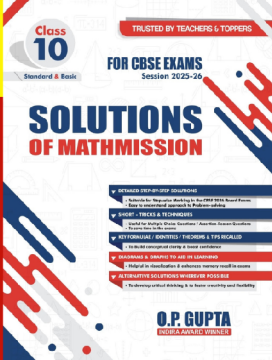
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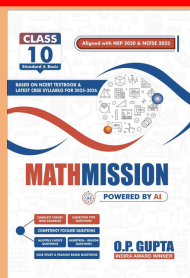
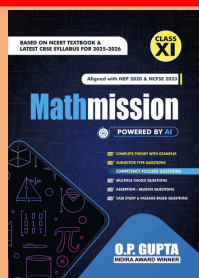
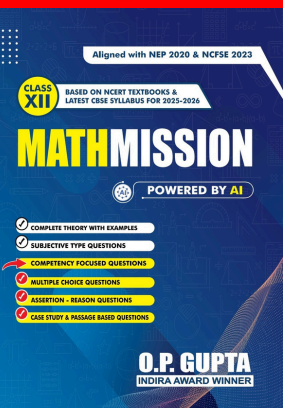
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