ASSERTION REASONING QUESTIONS

DIRECTION : In the following questions, 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.

1. Assertion : $P(x) = 4x^3 - x^2 + 5x^4 + 3x - 2$ is a polynomial of degree 3.
Reason : The highest power of x in the polynomial $P(x)$ is the degree of the polynomial.

(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.

Ans: The highest power of x in the polynomial $P(x) = 4x^3 - x^2 + 5x^4 + 3x - 2$ is 4.
Therefore, the degree of the polynomial P(x) is 4.
Correct option is (d) Assertion (A) is false but reason (R) is true.

2. Assertion : $x^3 + x$ has only one real zero.
Reason : A polynomial of nth degree must have n real zeroes.

(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.

Ans : Reason is false [a polynomial of nth degree has at most *n* zeroes.]
Again, $x^3 + x = x(x^2 + 1)$
which has only one real zero i.e. $x = 0$
$[x^2 + 1 \neq 0$ for all $x \in R]$
Assertion is true.
Correct option is (c) Assertion (A) is true but reason (R) is false.

3. Assertion : If one zero of poly-nominal $p(x) = (k^2 + 4)x^2 + 13x + 4k$ is reciprocal of other, then $k = 2$.

Reason : If $(x - a)$ is a factor of $p(x)$, then $p(a) = 0$ i.e. a is a zero of $p(x)$.

(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.

Ans : Let α, $1/\alpha$ be the zeroes of p(x) then we have

Product of Zeroes = $\alpha \times \frac{1}{\alpha} = \frac{4k}{k^2+4} = 1$

$\Rightarrow k^2 - 4k + 4 = 0$

$\Rightarrow (k - 2)^2 = 0 \Rightarrow k = 2$

(b) Both assertion (A) and reason (R) are true but reason (R) is not the correct explanation of assertion (A).

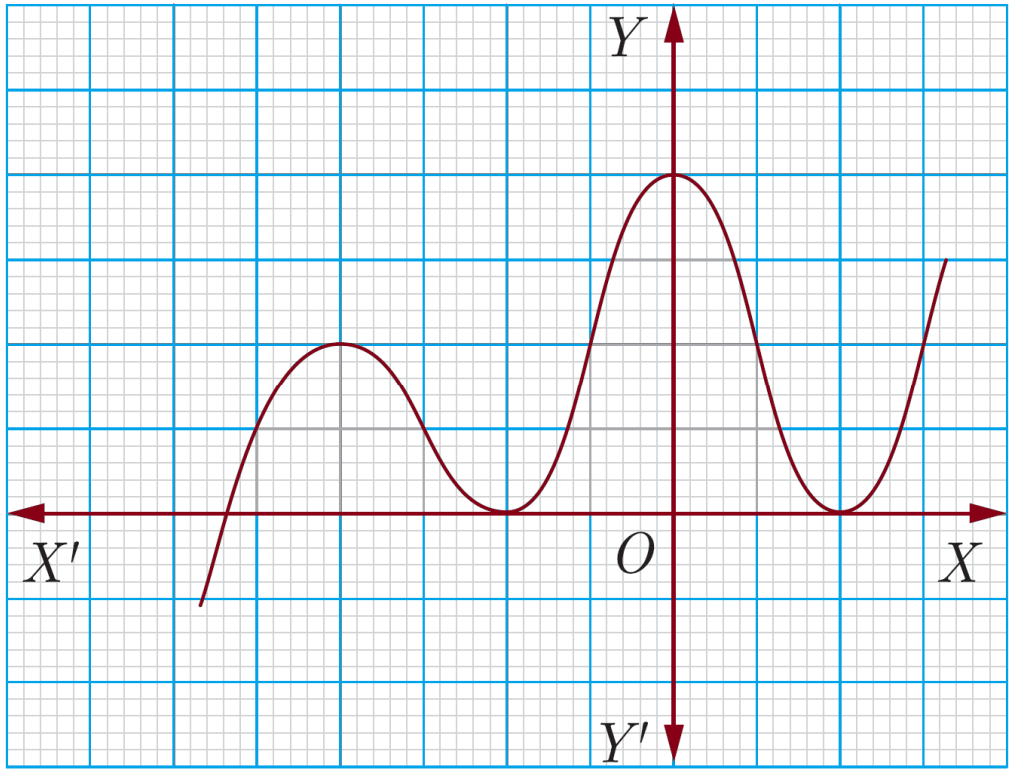
4. Assertion : $x^2 + 4x + 5$ has two zeroes.
Reason : A quadratic polynomial can have at the most two zeroes.

(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.

Ans : $p(x) = 0 \Rightarrow x^2 + 4x + 5 = 0$
Discriminant, $D = b^2 - 4ac$
$= 4^2 - 4 \times 1 \times 5$
$= 16 - 20 = -4 < 0$
Therefore, no real zeroes are there.
(d) Assertion (A) is false but reason (R) is true.

5. Assertion : The graph $y = f(x)$ is shown in figure, for the polynomial $f(x)$. The number of zeros of $f(x)$ is 3.

Reason : The number of zero of the polynomial $f(x)$ is the number of point of which $f(x)$ cuts or touches the axes.



Ans : As the number of zeroes of polynomial $f(x)$ is the number of points at which $f(x)$ cuts (intersects) the x –axis and number of zero in the given figure is 3.
So A is correct but R is not correct.
Correct Option (c) Assertion (A) is true but reason (R) is false.

6. Assertion: Degree of a zero polynomial is not defined.
Reason: Degree of a non-zero constant polynomial is 0

(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.

Ans : We know that, the constant polynomial 0 is called a zero polynomial.
The degree of a zero polynomial is not defined.
So, Assertion is true.
Now, the degree of a non-zero constant polynomial is zero.
So, Reason is true.
Since both Assertion and Reason are true and Reason is not a correct explanation of Assertion.
Correct option is (b)

7. Assertion : $x^2 + 7x + 12$ has no real zeroes.
Reason : A quadratic polynomial can have at the most two zeroes.

(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.

Ans : $x^2 + 7x + 12 = 0$
$\Rightarrow x^2 + 4x + 3x + 12 = 0$
$\Rightarrow x(x + 4) + 3(x + 4) = 0$
$\Rightarrow (x + 4)(x + 3) = 0$
$\Rightarrow (x + 4) = 0$ or $(x + 3) = 0$
$\Rightarrow x = -4$ or $x = -3$
Therefore, $x^2 + 7x + 12$ has two real zeroes.
Correction option is (d) Assertion (A) is false but reason (R) is true.

8. Assertion : If the sum of the zeroes of the quadratic polynomial $x^2 - 2kx + 8$ are is 2 then value of k is 1.

Reason : Sum of zeroes of a quadratic polynomial $ax^2 + bx + c$ is $-b/a$

(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.

Ans : Relation is true as we know that *Sum of zeroes* = $\frac{-b}{a}$

$\Rightarrow \frac{-(-2k)}{1} = 2 \Rightarrow k = 1$

So, Assertion is true.

Correct option is (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

9. Assertion : If the product of the zeroes of the quadratic polynomial $x^2 + 3x + 5k$ is -10 then value of k is -2.

Reason : Sum of zeroes of a quadratic polynomial $ax^2 + bx + c$ is $-b/a$

(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.

Ans : Reason is true as we know that *Sum of zeroes* = $\frac{-b}{a}$

Also we know that *Product of zeroes* = $\frac{c}{a}$

$\Rightarrow \frac{5k)}{1} = -10 \Rightarrow k = -2$

So, Assertion is true. But Reason is not the correct explanation of assertion.

Correct option is (b)

10. Assertion : $3 - 2\sqrt{5}$ is one zero of the quadratic polynomial then other zero will be $3 + 2\sqrt{5}$.

Reason : Irrational zeros (roots) always occurs in pairs.

(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.

Ans : As irrational roots/zeros always occurs in pairs therefore, when one zero is $3 - 2\sqrt{5}$ then other will be $3 + 2\sqrt{5}$.

So, both A and R are correct and R explains A.

Correct option is (a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A).

11. Assertion : A quadratic polynomial, sum of whose zeroes is 8 and their product is 12 is $x^2 – 20x + 96$.

Reason: If α and β be the zeroes of the polynomial f(x), then polynomial is given by $f(x) = x^2 - (\alpha + \beta)x + \alpha\beta$

(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.

Ans : Reason is correct. If α and β be the zeroes of the required polynomial f(x), then $(\alpha + \beta) = 8$ and $\alpha\beta = 12$

$\therefore f(x) = x^2 - (\alpha + \beta)x + \alpha\beta$

$\Rightarrow f(x) = x^2 - 8x + 12$

So, Assertion is not correct

Correct option is (d)