Self Test Solution: Algebra AND Quadratic Equation.

① $x^2 - Kx + K^2 = 0.$

$a = 1 \quad b = -K, \quad c = K^2$

P. $S.O.R = -\frac{b}{a}$

$= \frac{-(-K)}{1}$

$\boxed{S.O.R = K}$ Ⓐ Ans.

② $S.O.R = S$

$P.O.R = P$

$x^2 - (S.O.R)x + P.O.R = 0$

$\boxed{x^2 - Sx + P = 0}$

Ⓑ Ans.

③ $\alpha = 4 + \sqrt{5}, \quad \beta = 4 - \sqrt{5}$

$\alpha + \beta = 4 + \cancel{\sqrt{5}} + 4 - \cancel{\sqrt{5}} = 8$

$\alpha\beta = (4+\sqrt{5})(4-\sqrt{5})$

$\alpha\beta = (4)^2 - (\sqrt{5})^2 = 11$

$x^2 - (\alpha+\beta)x + \alpha\beta = 0$

$x^2 - 8x + 11 = 0$

Ⓑ Ans

④ $x^2 - 3x + a = 0.$

$\alpha = 2$

$\alpha + \beta = \frac{-b}{a}$

$\alpha\beta = \frac{c}{a}$

$2 + \beta = \frac{-(-3)}{1}$

$(2)(\beta) = \frac{a}{1}$

$2 + \beta = 3$

$\boxed{a = 2\beta}$

$\boxed{\beta = 1}$

$\boxed{a = 2 \times 1 = 2}$ Ⓒ Ans

⑤ $2x^2 - 4x + 5 = 0$

$a = 2, \; b = -4, \; c = 5$

$\alpha + \beta = \frac{-b}{a} = \frac{-(-4)}{2} = 2$

$\alpha\beta = \frac{c}{a} = 5/2$

$\alpha^2\beta + \alpha\beta^2 = \alpha\beta(\alpha+\beta)$

$= \frac{5}{\cancel{2}}(\cancel{2}) = 5$

Ⓒ Ans.

⑥ $x^2 - 2x + 1 = 0.$

$\alpha + \beta = 2$

$(\alpha-\beta)^2 = ?$

$\alpha\beta = 1$

$\alpha - \beta = \sqrt{(\alpha+\beta)^2 - 4\alpha\beta}$

$(\alpha-\beta)^2 = (\alpha+\beta)^2 - 4\alpha\beta$

$= (2)^2 - 4(1)$

$= \cancel{4} - \cancel{4} \; 0$

Ⓓ Ans.

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(19) $x^3 - 3x - 2 = 0$

Put option 'C' to Satisfy

(C) $-1, -1, 2$

$(-1)^3 - 3(-1) - 2 = 0$

$-1 + 3 - 2 = 0$

$\cancel{-3} + \cancel{3} = 0$

$0 = 0$

$(2)^3 - 3(2) - 2$

$8 - 6 - 2$

$\cancel{8} - \cancel{8}$

0 (C) Ans.

(20) $\sqrt{2x-6} + \sqrt{x+4} = 5$

put option (A)

$\sqrt{2\times5-6} + \sqrt{5+4} = 5$

$\sqrt{4} + \sqrt{9} = 5$

$2 + 3 = 5$

$5 = 5$ (A) Ans

(21) $2^{2t} - 3 . 2^{t+2} + 32 = 0$

put option A

$2^{2(2)} - 3 . 2^{2+2} + 32 = 0$

$16 - 48 + 32 = 0$

$\cancel{48} - \cancel{48} = 0$

$0 = 0$ (A) Ans.

(22) $2x^4 - 3x^3 - x^2 - 3x + 2 = 0$

put $x = 1/x$

$2\left(\frac{1}{x}\right)^4 - 3\left(\frac{1}{x}\right)^3 - 3\left(\frac{1}{x}\right)^2 - 3\left(\frac{1}{x}\right) + 2 = 0$

$\frac{2}{x^4} - \frac{3}{x^3} - \frac{1}{x^2} - \frac{3}{x} + 2 = 0$

$2 - 3x - x^2 - 3x^3 + 2x^4 = 0$

Reciprocal (B)

(23) $(1 + \omega - \omega^2)^4$

Put $1 + \omega = -\omega^2$

$(-\omega^2 - \omega^2)^4$

$(-2\omega^2)^4$

$(-2)^4 (\omega^2)^4$

$16 \omega^8$

$16 . \omega^6 . \omega^2$

$16 (1) \omega^2$

$16 \omega^2$

(C)

(24) $4x + x^{-1} + 7 = 0$

$4x + \frac{1}{x} + 7 = 0$

$\frac{4x^2 + 1 + 7x}{x} = 0$

$4x^2 + 7x + 1 = 0 \times x$

$\boxed{S.O.R = -\frac{b}{a} = -\frac{7}{4}}$

(C)

(13) $g(x) = x^3 - 7x^2 + 3x + a$

$R = 1$

$x + 1 = 0$

$x = -1$

$(-1)^3 - 7(-1)^2 + 3(-1) + a = 1$

$-1 - 7 - 3 + a = 1$

$a = 1 + 1 + 7 + 3$

$a = 12$ (D) Ans

(14) $5x^2 + 13x + K$

if one Root is reciprocal of other

$a = 5, b = 13$

$c = K$

$c = a$

$\boxed{K = 5}$

(A) ans

(15) $\alpha = 2 - \sqrt{3}$

β is must be Conjugate of α

$\beta = 2 + \sqrt{3}$

(B) Ans

(16) $(x^2 - 9)(x^2 - 4) = 0$

$x^2 - 9 = 0$ $x^2 - 4 = 0$

$\sqrt{x^2} = \sqrt{9}$ $\sqrt{x^2} = \sqrt{4}$

$x = \pm 3$ $x = \pm 2$

Sum $= 3 - 3 + 2 - 2$

$\boxed{\text{Sum} = 0}$ (D)

(17) $x^{24} + x^{23} + 1 \div x + 1$

$x + 1 = 0$

$x = -1$

$(-1)^{24} + (-1)^{23} + 1$

$\cancel{1} - \cancel{1} + 1$

$+1$ (B) Ans

(18) $\lambda x^2 + 6x + (2\lambda - 1) = 0$

$a = \lambda$, $b = 6$ $c = 2\lambda - 1$

$S.O.R = \frac{-b}{a}$

$+1 = \frac{+(6)}{\lambda}$

$\boxed{\lambda = 6}$ (D)

⑦ $(b-c)x^2+(c-a)x+(a-b)=0$

$\alpha = 2\beta$

Using shortcut.

$nb^2 = (n+1)^2 ac$

$n=2$, $a=b-c$, $b=c-a$, $c=a-b$

$2(c-a)^2 = (2+1)^2 (b-c)(a-b)$

$2\{-(a-c)\}^2 = 9(b-c)(a-b)$

Ⓐ Ans

⑧ $\alpha x^2+6x+\alpha^2+1=0$

$a=\alpha$, $b=6$, $c=\alpha^2+1$

$P.O.R = -2$

$\frac{c}{a} = -2$

$\frac{\alpha^2+1}{\alpha} = -2$

$\alpha^2+1 = -2\alpha$

$\alpha^2+2\alpha+1=0$

$\sqrt{(\alpha+1)^2} = \sqrt{0}$

$\alpha+1=0$

Ⓑ Ans $\alpha=-1$

⑨ $x^3+\alpha x^2-7x+6$ by $x+2$

Take,

$x+2=0$

$x=-2$

$(-2)^3+\alpha(-2)^2-7(-2)+6 = R$

$-8+4\alpha+14+6 = -4$

$4\alpha = -4+8-14-6$

$\cancel{4}\alpha = -\cancel{16}^{\,4}$

Ⓐ ans.

⑩ $3x^3+5x+9+8x^{-1}+3x^{-2}$

It is not a polynomial because all power are not positive.

⑪ $3x^2+kx+3=0$

$a=3$, $b=k$, $c=3$

$D = b^2-4ac$

For equal Root $D=0$

$(k)^2-4(3)(3)=0$

$\sqrt{k^2} = \sqrt{36}$

$k=\pm 6$

Ⓑ Ans

⑫ $(2+\omega)(2+\omega^2)$

$4+2\omega^2+2\omega+\omega^3$

$4+2(\omega^2+\omega)+\omega^3$

$\omega+\omega^2=-1 \quad \omega^3=1$

$4+2(-1)+1$

$5-2$

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Ⓒ Ans

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