16. Ans: [c]

Let $\frac{0.009}{x} = 0.01;$

Then $x = \frac{0.009}{0.01} = \frac{0.9}{1} = 0.9$

17. Ans: [d]

Given expression $= \frac{(0.3333)}{(0.2222)} \times \frac{(0.1667)(0.8333)}{(0.6667)(0.1250)}$

$$= \frac{3333}{2222} \times \frac{\frac{1}{6} \times \frac{5}{6}}{\frac{2}{3} \times \frac{125}{1000}}$$

$$= \left(\frac{3}{2} \times \frac{1}{6} \times \frac{5}{6} \times \frac{3}{2} \times 8\right)$$

$$= \frac{5}{2}$$

$$= 2.50$$

18. Ans: [b]

$4 \times 162 = 648.$ Sum of decimal places = 6.

So, $0.04 \times 0.0162 = 0.000648 = 6.48 \times 10^{-4}$

19. Ans: [b]

Given Expression $= \frac{(a^2 - b^2)}{(a+b)(a-b)} = \frac{(a^2 - b^2)}{(a^2 - b^2)} = 1.$

20. Ans: [a]

$\frac{144}{0.144} = \frac{14.4}{x}$

$\Rightarrow \frac{144 \times 1000}{144} = \frac{14.4}{x}$

$\Rightarrow x = \frac{14.4}{1000} = 0.0144$

SESSION - 10

ALGEBRA - I

1. Ans: [c]

$7a + 8b = 53$ ... (i)

$9a + 5b = 47$ ... (ii)

(i) $\times 5 \rightarrow 35a + 40b = 265$ ... (iii)

(ii) $\times 8 \rightarrow 72a + 40b = 376$ ... (iv)

$(iv) - (iii) \rightarrow 37a = 111$

$\Rightarrow a = \frac{111}{37} = 3$

Substituting for a in (i),

$21 + 8b = 53 \Rightarrow b = \frac{32}{8} = 4$

$\therefore$ The solution is (3, 4)

2. Ans: [b]

Let the present age be x years.

Then, $7(x+7) + 3(x-3) = 12x$

$\Rightarrow 7x + 49 + 3x - 9 = 12x$

$\Rightarrow 2x = 40 \quad \Rightarrow x = 20$ years

$\therefore$ Age after 3 years = 20 + 3 = 23 years

3. Ans: [a]

Let the initial number of chickens be x.

$\frac{x \times 30}{1} = \frac{(x-10) \times 150}{3}$

$\Rightarrow 90x = 150x - 1500$

$\Rightarrow 60x = 1500$

$\Rightarrow \quad x = \frac{1500}{60} = 25$

So, the initial number of chickens = 25

4. Ans: [c]

Let the cost of each chocolate be Rs.x and each biscuit be Rs.y and each lolly-pops be Rs.z.

Then, $4x + 6y + 12z = 36$

$\Rightarrow 2x + 3y + 6z = 18$ ... (i)

$3x + 15y + 9z = 48$

$\Rightarrow x + 5y + 3z = 16$ ... (ii)

$(ii) \times 2 - 1 \Rightarrow 7y = 14 \Rightarrow y = 2$

$\therefore$ The cost of 1 biscuit = Rs.2

5. Ans: [b]

Let tree II grow x feet after 1 year.

$\therefore \left(\frac{3x}{7} + x\right) \times 3 = 3$

$\Rightarrow \frac{10x}{7} = 1 \quad \Rightarrow x = \frac{7}{10}$ ft

Tree II takes $\frac{7}{\frac{7}{10}}$ years to grow 7 ft.

$\therefore$ Time required = 10 years

6. Ans: [d]

$x^2 - 7x + 12 = 0$

Sum of the roots = 7, product of the roots = 12

$\Rightarrow \alpha + \beta = 7, \ \alpha\beta = 12$

Sum of the reciprocals of the roots $= \frac{1}{\alpha} + \frac{1}{\beta} = \frac{\alpha + \beta}{\alpha\beta}$

$$= \frac{7}{12}$$

Product of the reciprocals of the roots $= \frac{1}{\alpha\beta} = \frac{1}{12}$

$\therefore$ The required equation is $x^2 - \frac{7}{12}x + \frac{1}{12} = 0$

$$\Rightarrow 12x^2 - 7x + 1 = 0$$

7. Ans: [b]

$\sqrt{4x+9} - \sqrt{11x+1} - \sqrt{7x+4} = 0$

$\Rightarrow \sqrt{4x+9} - \sqrt{7x+4} = \sqrt{11x+1}$

$\Rightarrow (4x+9) + (7x+4) - 2\sqrt{(4x+9)(7x+4)} = 11x+1$

$\Rightarrow 2\sqrt{(4x+9)(7x+4)} = 12$

$\Rightarrow (4x+9)(7x+4) = 36$

$\Rightarrow 28x^2 + 79x + 36 = 36 \qquad \Rightarrow 28x^2 + 79x = 0$

$\Rightarrow x = 0 \text{ or } -\frac{79}{28}$

As $x \geq -\frac{1}{11}$, $x = -\frac{79}{28}$ is not a root.

$\therefore$ The solution is x = 0

There is 1 solution

8. Ans: [d]

$(\cos p - 1)x^2 + (\cos p)x + \sin p = 0$

If the equation has real roots,

$\cos^2 p - 4\sin p(\cos p - 1) \geq 0$

$\Rightarrow \cos^2 p - 4\sin p\cos p + 4\sin p \geq 0$

$\Rightarrow (\cos p - 2\sin p)^2 - 4\sin^2 p + 4\sin p \geq 0$

$\Rightarrow (\cos p - 2\sin p)^2 + 4\sin p(1 - \sin p) \geq 0$

$(\cos p - 2\sin p)^2$ is always ≥ 0

For $1 - \sin p$ to be non-negative, $\sin p \leq 1$

This is possible in the interval $(0, \pi)$

9. Ans: [b]

$5x^2 + 4x + p(p-2) = 0$

The roots are real if discriminant ≥ 0

$\Rightarrow 16 - 20p(p-2) \geq 0$

$\Rightarrow 4 - 5p(p-2) \geq 0$

$\Rightarrow p(p-2) \leq \frac{4}{5}$

The roots will be of opposite sign if $\frac{p(p-2)}{5} < 0$

$\Rightarrow p(p-2) < 0 \Rightarrow p < 0 \text{ and } p > 2$

or

$p > 0$ and $p < 2$

$\Rightarrow 0 < p < 2$ or $(0, 2)$

10. Ans: [c]

Since α, β are the roots of the equation

$(x-a)(x-b) = c$ or $x^2 - (a+b)x + ab - c = 0$

$\alpha + \beta = a + b, \qquad \alpha\beta = ab - c$

Since $a + b = \alpha + \beta$ and $ab = \alpha\beta + c$, a, b are the roots of

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

$\Rightarrow (x - \alpha)(x - \beta) + c = 0$

$\therefore$ The required roots are a and b.

11. Ans: [a]

p and q are the roots of $x^2 - 2x + A = 0$

$\Rightarrow p + q = 2, pq = A$

r and s are the roots of $x^2 - 18x + B = 0$

$\Rightarrow r + s = 18, rs = B$

Since p, q, r, s are in A.P.,

Let $p = a - 3d, q = a - d, r = a + d, s = a + 3d$

As $p < q < r < s, d > 0$

$2 = p + q = 2a - 4d$

$18 = r + s = 2a + 4d$

Solving, we get $a = 5, d = 2$

$p = -1, q = 3, r = 7$ and $s = 11$

$A = pq = -3$

$B = rs = 77$

$\therefore (A, B)$ is $(-3, 77)$

12. Ans: [c]

Let the fraction be x.

$x + \frac{1}{x} = \frac{85}{18}$

$\Rightarrow x^2 + 1 = \frac{85}{18}x \Rightarrow 18x^2 - 85x + 18 = 0$

$\Rightarrow (9x - 2)(2x - 9) = 0$

$\Rightarrow x = \frac{2}{9} \text{ or } \frac{9}{2}$

But $x \neq \frac{9}{2}$

$\therefore$ The fraction is $\frac{2}{9}$

13. Ans: [a]

α, β are the roots of $ax^2 + bx + c = 0$

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

But $\alpha + \beta = \frac{1}{\alpha^2} + \frac{1}{\beta^2}$

$\Rightarrow \alpha + \beta = \frac{\alpha^2 + \beta^2}{\alpha^2\beta^2}$

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

$$\Rightarrow \frac{c^2}{a^2}\left(-\frac{b}{a}\right)=\frac{b^2}{a^2}-2\frac{c}{a}$$

$$\Rightarrow -bc^2 = ab^2 - 2a^2c$$

$$\Rightarrow 2a^2c = ab^2 + bc^2$$

$\Rightarrow ab^2, ca^2, bc^2$ are in A.P..

14. Ans: [d]

Since α is the root of $a^2x^2 + bx + c = 0$

$$a^2\alpha^2 + b\alpha + c = 0$$

Since β is the root of $a^2x^2 - bx - c = 0$

$$a^2\beta^2 - b\beta + c = 0$$

Let $f(x) = a^2x^2 + 2bx + 2c$

$$f(\alpha) = a^2\alpha^2 + 2b\alpha + 2c$$

$$= 2\left(a^2\alpha^2 + bx + c\right) - a^2\alpha^2$$

$$= 2\times 0 - a^2\alpha^2 = -a^2\alpha^2 < 0$$

$$f(\beta) = a^2\beta^2 + 2b\beta + 2c$$

$$= 3\alpha^2\beta^2 - 2\left(\alpha^2\beta^2 - b\beta - c\right)$$

$$= 3\alpha^2\beta^2 - 0$$

$$= 3\alpha^2\beta^2 > 0$$

$\therefore$ In the interval (α, β), $f(x)$ becomes 0 atleast once

Hence $\alpha < \gamma < \beta$

15. Ans: [b]

$ax^2 + bx + c = 0$ has roots α & β.

$$\therefore \alpha = \frac{-b+\sqrt{b^2-4ac}}{2a}, \beta = \frac{-b-\sqrt{b^2-4ac}}{2a}$$

$$ax^2 - bx(x-1) + c(x-1)^2 = 0$$

$$\Rightarrow (a-b+c)x^2 + (b-2c)x + c = 0$$

$$\text{Disct} = (b-2c)^2 - 4c(a-b+c)$$

$$= b^2 - 4bc + 4c^2 - 4ac + 4bc - 4c^2$$

$$= b^2 - 4ac$$

If A and B are the roots of the equation

$$A = \frac{-(b-2c)+\sqrt{b^2-4ac}}{2(a-b+c)}, B = \frac{-(b-2c)-\sqrt{b^2-4ac}}{2(a-b+c)}$$

$$A = \frac{-\frac{b}{2a}+\frac{c}{a}+\frac{\sqrt{b^2-4ac}}{2a}}{1-\frac{b}{a}+\frac{c}{a}},\quad B = \frac{-\frac{b}{2a}+\frac{c}{a}-\frac{\sqrt{b^2-4ac}}{2a}}{1-\frac{b}{a}+\frac{c}{a}}$$

$$A = \frac{\alpha+\alpha\beta}{1+\alpha+\beta+\alpha\beta} = \frac{\alpha(1+\beta)}{(1+\alpha)(1+\beta)} = \frac{\alpha}{1+\alpha}$$

$$B = \frac{\beta+\alpha\beta}{1+\alpha+\beta+\alpha\beta} = \frac{\beta(1+\alpha)}{(1+\alpha)(1+\beta)} = \frac{\beta}{1+\beta}$$

16. Ans: [c]

$$2\sqrt{5}-1 > \sqrt{3} \Rightarrow \tan^{-1}\left(2\sqrt{5}-1\right) > \tan^{-1}\sqrt{3} = \frac{\pi}{3} > 1$$

$$\therefore A = \tan^{-1}\left(2\sqrt{5}-1\right) > 1$$

Let the other root be B

Then AB = 1 $\Rightarrow B = \frac{1}{A} < 1$

17. Ans: [b]

p and q are the roots of $x^2 + px + q = 0$

$$\Rightarrow pq = q, p + q = -p$$

$$\Rightarrow q(p-1) = 0 \Rightarrow q = 0 \text{ or } p = 1$$

If $q = 0$, we get $p = 0$

If $p = 1$, we get $q = -p - p = -2$

Thus $p = 1$ or 0

18. Ans: [c]

$$ax^2 + 2bx + c = 0$$

Since a, b, c are in G.P., $b^2 = ac \Rightarrow b = \sqrt{ac}$

The equation can be written as

$$ax^2 + 2\sqrt{ac}\,x + c = 0$$

$$\Rightarrow \left(\sqrt{a}x + \sqrt{c}\right)^2 = 0$$

$$\Rightarrow x = -\sqrt{\frac{c}{a}}, -\sqrt{\frac{c}{a}}$$

Also $ax^2 + 2bx + c = 0$ has equal roots.

So the two given equations have a common root if $-\sqrt{\frac{c}{a}}$ is a root of $dx^2 + 2ex + f = 0$

$$\Rightarrow d\left(\frac{c}{a}\right) - 2e\sqrt{\frac{c}{a}} + f = 0$$

$$\Rightarrow \frac{d}{a} - \frac{2e}{\sqrt{ac}} + \frac{f}{c} = 0 \qquad \left[\because b = \sqrt{ac}\right]$$

$$\Rightarrow \frac{2e}{b} = \frac{d}{a} + \frac{f}{c}$$

$\Rightarrow \frac{d}{a}, \frac{e}{b}, \frac{f}{c}$ are in A.P.

$\Rightarrow \frac{a}{d}, \frac{b}{e}, \frac{c}{f}$ are in H.P.

19. Ans: [b]

$$x^2 + px + 1 = (x-a)(x-b)$$

$$x^2 + qx + 1 = (x-c)(x-d)$$

$$(a-c)(b-c)(a+d)(b+d)$$

$=(c-a)(c-b)(-a-d)(-b-d)$

$=\left(c^2+pc+1\right)\left[(-d)^2-pd+1\right]$

$=\left(c^2+pc+1\right)\left(d^2-pd+1\right)$

But, both $c^2+pc+1=0,\ d^2-pd+1=0$

$\therefore(a-c)(b-c)(a+d)(b+d)$

$=(pc-qc)(-qd-pd)\ \left[\because c^2+1=-pc, d^2+1=pd\right]$

$=cd(p-q)(-q-p)$

$=cd(q-p)(p+q)$

$=cd\left(q^2-p^2\right)=q^2-p^2 \qquad [\because cd=1]$

20. Ans: [d]

$\left[a^2-5a+3\right]x^2+(3a-1)x+2=0$

Let α and 2α be the roots

$\therefore\left(a^2-5a+3\right)\alpha^2+(3a-1)\alpha+2=0 \quad \text{... (i)}$

$\left(a^2-5a+3\right)\left(4\alpha^2\right)+(3a-1)(2\alpha)+2=0 \quad \text{... (ii)}$

$(i)\times4-(ii)\to(3a-1)2\alpha+6=0$

$\Rightarrow\alpha=\dfrac{-3}{3a-1}$

Putting this value in (i)

$\left(a^2-5a+3\right)9-(3a-1)^2(3)+2(3a-1)^2=0$

$\Rightarrow9a^2-45a+27-9a^2+18a-3+18a^2-12a+2=0$

$\Rightarrow-39a+26=0$

$\Rightarrow a=\dfrac{2}{3}$

SESSION – 11

ALGEBRA – II

21. Ans: [c]

$5x+9y+17z=a$

$2x+3y+8z=c$

$4x+8y+12z=b$

$4a-3b-4c=4(5x+9y+17z)$

$-3(4x+8y+12z)$

$-4(2x+3y+8z)$

$=20x+36y+68z$

$-12x-24y-36z$

$-8x-12y-32z=0$

$\Rightarrow4a-3b-4c=0$

22. Ans: [a]

ax^2+bx+c

when $x=0, c=4$

$\left.\begin{array}{l}f(-1)=4\Rightarrow a-b+c=4\\ f(-2)=6\Rightarrow4a-2b+c=6\end{array}\right\}$

$\Rightarrow\left.\begin{array}{l}a-b=0\\ 4a-2b=2\end{array}\right\}$

$\Rightarrow a=1, b=1$

$\therefore$ a, b, c are 1, 1, 4.

23. Ans: [d]

$3x+2y+z=17 \quad \text{... (i),}$

$2x+4y+6z=38 \quad \text{... (ii)}$

$2\times(i)+(ii)\to8x+8y+8z=34+38=72$

$\Rightarrow x+y+z=9$

24. Ans: [b]

x = 1 is a root of the quadratic equations

$ax^2+ax+3=0$ and $x^2+x+b=0$

$\therefore a+a+3=0$ and $1+1+b=0$

$\Rightarrow a=-\dfrac{3}{2}$ and $b=-2$

$\Rightarrow ab=\left(-\dfrac{3}{2}\right)(-2)=3$

$\Rightarrow ab=3$

25. Ans: [d]

Subtract 3 from both the sides of the given equation,

$\dfrac{x-a}{b+c}-1+\dfrac{x-b}{c+a}-1+\dfrac{x-c}{a+b}-1=0$

$(x-a-b-c)\left(\dfrac{1}{b+c}+\dfrac{1}{c+a}+\dfrac{1}{a+b}\right)=0$

By the given data, $\left(\dfrac{1}{b+c}+\dfrac{1}{c+a}+\dfrac{1}{a+b}\right)\neq0$

$\Rightarrow x-a-b-c=0$ or $x=a+b+c$

26. Ans: [a]

$\dfrac{x^2-7x+12}{2x^2+4x+5}>0\ \Rightarrow x^2-7x+12>0$

$\Rightarrow(x-4)(x-3)>0$

$\Rightarrow x-4>0, x-3>0$ or

$x-4<0, x-3<0$

$\Rightarrow x>4$ and $x>3$ or

$x<4$ and $x<3$

$\Rightarrow x>4$ or $x<3$

27. Ans: [c]

Let $x+\dfrac{1}{x}=y\Rightarrow x^2+\dfrac{1}{x^2}=y^2-2$

$$2\left(x^2+\frac{1}{x^2}\right)-9\left(x+\frac{1}{x}\right)+14=0$$

$$\Rightarrow 2y^2-4-9y+14=0$$

$$\Rightarrow 2y^2-9y+10=0c$$

$$\Rightarrow (2y-5)(y-2)=0$$

$$\Rightarrow y=\frac{5}{2},2$$

when $x+\frac{1}{x}=\frac{5}{2}$, we get $x=2$ or $\frac{1}{2}$

when $x+\frac{1}{x}=2$, we get x = 1

$\therefore$ There are 3 values for $x=2,\frac{1}{2},1$

28. Ans: [b]

2, 3 are the roots of $2x^3+mx^2-13x+n=0$

$\therefore 16+4m-26+n=0, 54+9m-39+n=0$

$\Rightarrow 4m+n=10,\ 9m+n=-15$

Solving for m and n, we get

$5m=-25 \Rightarrow m=-5$

and $n=10-4m=10+20=30$

$\therefore m=-5,\ n=30$

29. Ans: [a]

Let the number of chocolates in the plate be x.

$$\therefore \frac{1}{3}x+\frac{1}{3}\times\frac{2}{3}x+\frac{1}{3}\times\left[x-\left(\frac{1}{3}+\frac{2}{9}\right)x\right]+8=x$$

$$\Rightarrow \frac{1}{3}x+\frac{2}{9}x+\frac{4}{27}x+8=x$$

$$\Rightarrow \frac{19}{27}x+8=x \Rightarrow \frac{8x}{27}=8 \Rightarrow x=27$$

$\therefore$ The number of chocolates in the plate = 27.

30. Ans: [b]

$$\frac{(x+2)(x-5)}{(x-3)(x+6)}=\frac{(x-2)}{(x+4)}$$

$(x^3 + x^2 - 22x - 40) - (x^3 + x^2 - 24x + 36) = 0$

$2x - 76 = 0$

i.e. $(x - 38) = 0$, has only one root.

31. Ans: [a]

Let the number of pens, pencils and erasers be x, y, z respectively.

$x + y + z = 100$ ... (i)

$5x+y+\frac{z}{20}=100$

$\Rightarrow 100x + 20y + z = 2000$ ... (ii)

(ii) – (i) $\rightarrow$ $99x + 19y = 1900$ ... (iii)

Since x and y are positive integers, x = 19 and y = 1

$\therefore$ The number of pencils = 1

32. Ans: [c]

Let the present age be x years.

$x+8=3(x-4)$

$\Rightarrow 2x = 20 \quad \Rightarrow x = 10$ years

$\therefore$ Age will be 24 years after 14 years from now.

33. Ans: [a]

Let the length of each step be x inches.

$18x=16(x+2)\Rightarrow 2x=32\Rightarrow x=16$ inches

Distance between the home and the lake

$=18\times16$ inches

$=\frac{18\times16}{12}$ feet

= 24 feet

34. Ans: [a]

$f(x)=x^2+2x-5$

$g(x)=5x+30$

$g[f(x)]=5(x^2+2x-5)+30$

$=5x^2+10x+5$

$\therefore 5x^2+10x+5=0$

$\Rightarrow x^2+2x+1=0$

$\Rightarrow (x+1)^2=0$

$\Rightarrow x=-1,-1$

35. Ans: [d]

$$6\sqrt{\frac{x}{x+4}}-2\sqrt{\frac{x+4}{x}}=11$$

Let $\sqrt{\frac{x}{x+4}}=y$

$\therefore 6y-\frac{2}{y}=11$

$\Rightarrow 6y^2-11y-2=0$

$\Rightarrow y=-\frac{1}{6}$ or $y=2$

But y cannot be negative

So, y = 2

$\sqrt{\frac{x}{x+4}}=2\Rightarrow\frac{x}{x+4}=4$

$\Rightarrow x = 4x + 16$

$\Rightarrow 3x = -16$

$\Rightarrow x=-\frac{16}{3}$

36. Ans: [c]

$2\left(x^2+\frac{1}{x^2}\right)-9\left(x+\frac{1}{x}\right)+14=0$

Put $x+\frac{1}{x}=y$

$\Rightarrow x^2+\frac{1}{x^2}=\left(x+\frac{1}{x}\right)^2-2=y^2-2$

$\therefore 2\left(y^2-2\right)-9y+14=0$

$\Rightarrow 2y^2-9y+10=0$

$\Rightarrow (2y-5)(y-2)=0$

$\Rightarrow y=\frac{5}{2}$ or 2

When $y=\frac{5}{2},\ x+\frac{1}{x}=\frac{5}{2}\Rightarrow x=2$ or $\frac{1}{2}$

When $y=2,\ x+\frac{1}{x}=2\ \Rightarrow x=1$

Hence $x=2,\frac{1}{2},1$

$\therefore$ The number of real values = 3

37. Ans: [a]

α,β are the roots of $x^2-x+p=0$

$\Rightarrow \alpha+\beta=1, \alpha\beta=p$

γ,δ are the roots of $x^2-4x+q=0$

$\Rightarrow \gamma+\delta=4, \gamma\delta=q$

Let r be the common ratio of the G.P..

Then $\frac{\gamma+\delta}{\alpha+\beta}=4\Rightarrow r^2=4\Rightarrow r=\pm 2$

When r = 2

We get $\alpha(1+r)=1\Rightarrow \alpha=\frac{1}{1+r}=\frac{1}{3}$

$p=\alpha\beta=\alpha\times\alpha r=\alpha^2 r=\frac{2}{9}$ which is not an integer

When $r=-2$,

$\alpha(1+r)=1\Rightarrow\alpha=-1$

$p=\alpha^2 r=-2$

$q=r\delta=\left(\alpha r^2\right)\left(\alpha r^3\right)=\alpha^2 r^5$

$=(-2)^5=-32$

$\therefore$ The values of p and q are $-2,-32$.

38. Ans: [a]

$ax^2+bx+c=0$

Let the roots be α and 3α.

$\therefore 3\alpha+\alpha=-\frac{b}{a}\Rightarrow 4\alpha=-\frac{b}{a}\Rightarrow\alpha=-\frac{b}{4a}$

$3\alpha^2=\frac{c}{a}$

$\Rightarrow 3\left(\frac{-b}{4a}\right)^2=\frac{c}{a}\Rightarrow\frac{3b^2}{16a^2}=\frac{c}{a}$

$\Rightarrow\frac{3b^2}{16a}=c$

$\Rightarrow 3b^2=16ac$

39. Ans: [b]

$\left(a^2+b^2\right)x^2-2b(a+c)x+\left(b^2+c^2\right)=0$

Since the roots are equal, the discriminant is equal to 0.

$4b^2(a+c)^2-4\left(a^2+b^2\right)\left(b^2+c^2\right)=0$

$\Rightarrow b^2a^2+2b^2ac+b^2c^2-a^2b^2-b^4-a^2c^2-b^2c^2=0$

$\Rightarrow 2b^2ac-b^4-a^2c^2=0$

$\Rightarrow b^4+a^2c^2-2b^2ac=0$

$\Rightarrow\left(b^2-ac\right)^2=0\qquad\Rightarrow b^2=ac$

$\Rightarrow$ a, b, c are in G.P.

40. Ans: [c]

$x^2-(c+6)x+2(2c-1)=0$

Sum of the roots $=c+6$

Product of the roots $=2(2c-1)$

$c+6=\frac{1}{2}\times 2(2c-1)$

$\Rightarrow c+6=2c-1$

$\Rightarrow c=7$

SESSION – 12

FUNCTIONS – I

1. Ans: [d]

$F(x)=max\,(2x+1,3-4x)$ is minimum when $2x+1=3-4x$

i.e.$6x=2$

$x=2/6=1/3$

therefore minimum possible value of f(x) is

$(2x+1)(at\ x=1/3)=2*1/3+1=5/3$

or (3 – 4x) at x = 1/3 = 3 – 4.1/3 = 5/3

2. Ans: [d]

$F(x)=ax2-b|x|$

$ax^2>0$ for $a>0$ and

$(-b|x|)>0$ for $b<0$

$F(x)=ax2-b|x|\ >0\ for\ x\neq 0$

$F(0)=ax2-b|x|=0\ for\ x=0$

If $x=0$ $f(x)$ is minimised whenever, $a>0, b<0$.

3. Ans: [a]

Min $\{f(x2),h(x)\}<3$

$f(x2)<3\ or\ h(x)<3$

$2x^2-1<3\ or\ x^2+x+1<3$