EXERCISE – 3D

Formula Used -: $(x+y+z)^2 = x^2+y^2+z^2+2xy+2yz+2zx$

Answer.1.

(i) $(a+2b+5c)^2$

$.(a+2b+5c)^2 = (a)^2+(2b)^2+(5c)^2+2(a)(2b)+2(2b)(5c)+2(5c)(a)$

$= a^2+4b^2+25c^2+4ab+20bc+10ac$

(ii) $(2a-b+c)^2$

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

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

(iii) $(a-2b-3c)^2$

$.(a-2b-3c)^2 = (a)^2+(-2b)^2+(-3c)^2+2(a)(-2b)+2(-2b)(-3c)+2(-3c)(a)$

$= a^2+4b^2+9c^2-4ab+12bc-6ac$

Answer.2.

(i) $(2a-5b-7c)^2$

$.(2a-5b-7c)^2 = (2a)^2+(-5b)^2+(-7c)^2+2(2a)(-5b)+2(-5b)(-7c)+2(-7c)(2a)$

$= 4a^2+25b^2+49c^2-20ab+70bc-28ac$

(ii) $(-3a+4b-5c)^2$

$.(-3a+4b-5c)^2 = (-3a)^2+(4b)^2+(-5c)^2+2(-3a)(4b)+2(4b)(-5c)+2(-5c)(-3a)$

$= 9a^2+16b^2+25c^2-24ab-40bc+30ac$

(iii) $\left(\frac{1}{2}a-\frac{1}{4}b+2\right)^2$

$.\left(\frac{1}{2}a-\frac{1}{4}b+2\right)^2 = \left(\frac{1}{2}a\right)^2+\left(-\frac{1}{4}b\right)^2+(2)^2+2\left(\frac{1}{2}a\right)\left(-\frac{1}{4}b\right)+2\left(-\frac{1}{4}b\right)(2)+2(2)\left(\frac{1}{2}a\right)$

$= \frac{a^2}{4}+\frac{b^2}{16}+4-\frac{ab}{4}-b+2a$

Answer.3. $4x^2+9y^2+16z^2+12xy-24yz-16zx$

$4x^2+9y^2+16z^2+12xy-24yz-16zx = (2x)^2+(3y)^2+(-4z)^2+\{2(2x)(3y)\}+\{2(3y)(-4z)\}+\{2(-4z)(2x)\}$

$= \{(2x)+(3y)+(-4z)\}^2$

$= (2x+3y-4z)^2$

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

Answer.4. $9x^2+16y^2+4z^2-24xy+16yz-12zx$

$9x^2+16y^2+4z^2-24xy+16yz-12zx = (-3x)^2+(4y)^2+(2z)^2+\{2(-3x)(4y)\}+\{2(4y)(2z)\}+\{2(2z)(-3x)\}$

$= \{(-3x)+(4y)+(2z)\}^2$

$= (-3x+4y+2z)^2$

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

Answer.5. $25x^2+4y^2+9z^2-20xy-12yz+30zx$

$25x^2+4y^2+9z^2-20xy-12yz+30zx = (5x)^2+(-2y)^2+(3z)^2+\{2(5x)(-2y)\}+\{2(-2y)(3z)\}+\{2(3z)(5x)\}$

$= \{(5x)+(-2y)+(3z)\}^2$

$= (5x-2y+3z)^2$

$= (5x-2y+3z)(5x-2y+3z)$

Answer.6. $16x^2+4y^2+9z^2-16xy-12yz+24zx$

$16x^2+4y^2+9z^2-16xy-12yz+24zx = (4x)^2+(-2y)^2+(3z)^2+\{2(4x)(-2y)\}+\{2(-2y)(3z)\}+\{2(3z)(4x)\}$

$= \{(4x)+(-2y)+(3z)\}^2$

$= (4x-2y+3z)^2$

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

Answer.7. **(i)** $(99)^2$

$(99)^2 = (100 - 1)^2$

$= (100)^2 + (1)^2 - 2 \times 100 \times 1$

$= 10000 + 1 - 200$

$= 9801$

(ii) $(995)^2$

$(995)^2 = (1000 - 5)^2$

$= (1000)^2 + (5)^2 - 2 \times 1000 \times 5$

$= 1000000 + 25 - 10000$

$= 990025$

(iii) $(107)^2$

$(107)^2 = (100 + 7)^2$

$= (100)^2 + (7)^2 + 2 \times 100 \times 7$

$= 10000 + 49 + 1400$

$= 11449$