Exercise 3.5

Q. 1: If s varies directly as u^2 and inversely as v and s = 7 when u = 3, v = 2. Find the value of s when u = 6 and v = 10.

$$s \propto u^2$$
$$s \propto \frac{1}{v}$$
$$s = k\frac{u^2}{v} \text{ ---------- (i)}$$

Put s = 7, u = 3, v = 2

$$7 = k\frac{3^2}{2}$$
$$7 = k\frac{9}{2}$$
$$k = \frac{14}{9}$$

So, equation (i) becomes

$$s = \frac{14u^2}{9v} \text{ -------- (ii)}$$

Put u = 6 and v = 10 in equation (ii)

$$s = \frac{14(6)^2}{9(10)}$$
$$s = \frac{14(36)}{9(10)}$$
$$s = \frac{28}{5}$$

Q. 2: If w varies jointly as x, y^2 and z and w = 5 when x =2, y = 3, z = 10. Find w when x = 4, y = 7 and z = 3.

$$w \propto x$$
$$w \propto y^2$$
$$w \propto z$$
$$w = kxy^2z \text{ ---------- (i)}$$

Put w = 5, x = 2, y = 3, z = 10

$$5 = k(2)(3)^2(10)$$
$$5 = k(180)$$
$$k = \frac{5}{180}$$
$$k = \frac{1}{36}$$

So, equation (i) becomes

$$w = \frac{xy^2z}{36} \text{ -------- (ii)}$$

Put x = 4, y = 7 and z = 3 in equation (ii)

$$s = \frac{4(7)^2(3)}{36}$$
$$s = \frac{49}{3}$$

Q. 3: If y varies directly as x^3 and inversely as z^2 and t, and y = 16 when x = 4, z = 2, t = 3. Find the value of y when x = 2, z = 3 and t = 4.

$$y \propto x^3$$

$$y \propto \frac{1}{z^2}$$

$$y \propto \frac{1}{t}$$

$$y = k\frac{x^3}{z^2 t} \text{ ---------- (i)}$$

Put y=16, x = 4, z = 2, t = 3

$$16 = k\frac{4^3}{2^2.3}$$

$$16 = k\frac{64}{12}$$

$$k = \frac{12}{64} \times 16$$

$$k = 3$$

So, equation (i) becomes

$$y = \frac{3x^3}{z^2 t} \text{ -------- (ii)}$$

Put x = 2, z = 3 and t = 4 in equation (ii)

$$y = \frac{3(2)^3}{(3)^2(4)}$$

$$y = \frac{3(8)}{9(4)}$$

$$y = \frac{2}{3}$$

Q. 4: If u varies directly as x^2 and inversely as the product yz^3, and u = 2 when x = 8, y = 7, z = 2. Find the value of u when x = 6, y = 3, z = 2.

$$u \propto x^2$$

$$u \propto \frac{1}{yz^3}$$

$$u = k\frac{x^2}{yz^3} \text{ ---------- (i)}$$

Put u = 2, x = 8, y = 7, z = 2

$$2 = k\frac{8^2}{7.\ 2^3}$$

$$2 = k\frac{64}{56}$$

$$k = \frac{7}{8} \times 2$$

$$k = \frac{7}{4}$$

So, equation (i) becomes

$$u = \frac{7x^2}{4yz^3} \text{ -------- (ii)}$$

Put x = 6, y = 3 and z = 2 in equation (ii)

$$u = \frac{7(6)^2}{4(3)(2)^3}$$

$$y = \frac{7(36)}{12(8)}$$

$$y = \frac{21}{8}$$

Q. 5: If v varies directly as the product xy^3 and inversely as z^2 and v = 27 when x = 7, y = 6, z = 7. Find the value of v when x = 6, y = 2, z = 3.

$$v \propto xy^3$$

$$v \propto \frac{1}{z^2}$$

$$u = k\frac{xy^3}{z^2} \text{ ---------- (i)}$$

Put v = 27, x = 7, y = 6, z = 7

$$27 = k\frac{(7)(6)^3}{7^2}$$

$$27 = k\frac{216}{7}$$

$$k = \frac{7}{216} \times 27$$

$$k = \frac{7}{8}$$

So, equation (i) becomes

$$u = \frac{7xy^3}{8z^2} \text{ -------- (ii)}$$

Put x = 6, y = 2 and z = 3 in equation (ii)

$$u = \frac{7(6)(2)^3}{8(3)^2}$$

$$y = \frac{7(6)(8)}{8(9)}$$

$$y = \frac{14}{3}$$

Q. 6: If w varies inversely as the cube of u, and w = 5 when u = 3. Find w when u = 6.

$$w \propto \frac{1}{u^3}$$

$$w = \frac{k}{u^3} \text{ ---------- (i)}$$

Put w = 5 and u = 3

$$5 = \frac{k}{(3)^3}$$

$$5 = \frac{k}{27}$$

$$k = 135$$

So, equation (i) becomes

$$w = \frac{135}{u^3} \text{ -------- (ii)}$$

Put u = 6 in equation (ii)

$$w = \frac{135}{(6)^3}$$

$$w = \frac{135}{216}$$

$$w = \frac{5}{8}$$