7. a) Find the reduction formula for $\int \cos^n x dx$.

   b) Evaluate $\int_0^\infty \frac{dx}{(1+x^2)^4}$.

   c) Verify the Leibnitz rule of differentiation under the integral sign for $\int_0^{\pi/2} \frac{dx}{\alpha(1+\cos x)}$ where α is a parameter.

PART – D

Answer **one full** question. **(1×15=15)**

8. a) Find the equation of the plane through the intersection of the planes $x + 2y + 3z + 4 = 0$ and $2x + y - z + 5 = 0$ and perpendicular to the plane $5x + 3y + 6z + 8 = 0$.

   b) Prove that the lines $\frac{x-1}{2} = \frac{y-2}{3} = \frac{z-3}{4}$ and $\frac{x-2}{3} = \frac{y-3}{4} = \frac{z-4}{5}$ are coplanar. Also find the equation of the plane containing these two lines.

   c) Find the equation of the sphere which passes through the points (0, 0, 0), (1, 0, 0), (0, 1, 0), (0, 0, 1).

OR

9. a) Find the shortest distance between the lines $\frac{x}{2} = \frac{y}{-3} = \frac{z}{1}$ and $\frac{x-2}{3} = \frac{y-1}{-5} = \frac{z+2}{2}$.

   b) Derive the equation of right circular cone in its standard from $x^2 + y^2 = z^2 \tan^2\alpha$.

   c) Find the equation of the right circular cylinder of radius 2 and whose axis is $\frac{x-1}{2} = \frac{y+3}{-1} = \frac{z-3}{5}$.