4(b)

$$\int \sin^5 x \cos^6 x \, dx.$$

$$= \int \sin^4 x \cos^6 x \sin x \, dx.$$

$$= \int (\sin^2 x)^2 \cos^6 x \sin x \, dx.$$

$$= \int (1 - \cos^2 x)^2 \cos^6 x \sin x \, dx.$$

Set, $u = \cos x$ Then, $\frac{du}{dx} = -\sin x$

$$\Rightarrow \sin x \, dx = -du.$$

Now,

$$\int \sin^5 x \cos^6 x \, dx = \int (1 - \cos^2 x)^2 \cos^6 x \sin x \, dx.$$

$$= \int (1 - u^2)^2 u^6 \cdot (-1) \, du.$$

$$= -\int (1-u^2)^2 u^6 \, du.$$

$$= -\int [1 - 3u^2 \cdot$$

$$= -\int [1 - 2u + u^2$$

$$= -\int [(1)^2 - 2.1.u^2 + (u^2)^2] u^6 \, du$$

$$= -\int [1 - 2u^2 + u^4] u^6 \, du$$

$$= -\int [u^6 - 2u^8 + u^{10}] \, du.$$

$$= -\left[\frac{u^6}{6} - \frac{2}{8} \right]$$

$$= -\left[\frac{1}{7}u^7 - \frac{2}{9}u^9 + \frac{1}{11}u^{11} \right] + C$$

$$= -\left[\frac{1}{7}\cos 7x - \frac{2}{9}\cos 9x + \frac{1}{11}\cos 11x \right] + C.$$

(Ans).