Cobb - Douglas Production Function

$$Q = AK^{\alpha} L^{\beta}$$

where α = Share of Capital

and β = Share of Labour

Here, it is given that,

$$\alpha = \frac{1}{4} \quad \text{and} \quad \beta = \frac{3}{4}$$

$$\therefore \quad \boxed{Q = AK^{1/4} L^{3/4}}$$

Then, it is also given that

Growth of capital = 8%

$\therefore$ New amount of capital

$= K + 8\%$ of K

$= K + \frac{8}{100} \times K$

$= K + 0.08K$

$= 1.08K$

Similarly, New amount of Labour = 1.04 L where growth of labour is 4 %.

and New amound of total factor productivity i.e., A = 1.03 A.

Hence, Growth of output per annum $= 1.03\,A\,(1.08K)^{1/4}\,(1.04L)^{3/4}$

$= (1.03)A\,(1.08)^{1/4}\,K^{1/4}\,(1.04)^{3/4}\,L^{3/4}$

Rearranging the terms

$= A\,K^{1/4}\,L^{3/4}\,(1.03)\,(1.08)^{1/4}\,(1.04)^{3/4}$

$= Q\,(1.03)\,(1.08)^{1/4}\,(1.04)^{3/4}$

Now, we have to calculate the value of $(1.03)\,(1.08)^{1/4}\,(1.04)^{3/4}$.

To calculate the value of this expression, we first take log then antilog

∴ Now,

$\log 1.03 + \frac{1}{4} \log 1.08 + \frac{3}{4} \log 1.04$

$= 0.029 + 0.25 \log 1.08 + 0.75 \log 1.04$

$= 0.029 + 0.019 + 0.029$

$= 0.077$

Lastly, antilog (0.077)

$= 1.08$

Hence, Growth rate of output per annum $= 1.08\,Q$

$= Q + 0.08\,Q$

$$\boxed{= Q + 8\% \text{ of } Q}$$

8% Ans.