

Que 14:

Integrate $\int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx.$

[1999 - 5 Marks]

solution:

$$I = \int_0^{\pi} \frac{e^{\cos x}}{e^{\cos x} + e^{-\cos x}} dx$$

...(i)

$$\because \int_0^a f(x) dx = \int_0^a f(a-x) dx$$

$$I = \int_0^{\pi} \frac{e^{\cos(\pi-x)}}{e^{\cos(\pi-x)} + e^{-\cos(\pi-x)}} \Rightarrow I = \int_0^{\pi} \frac{e^{-\cos x}}{e^{-\cos x} + e^{\cos x}} \dots(ii)$$

Adding (i) and (ii), $2I = \int_0^{\pi} dx = \pi \Rightarrow I = \pi/2$