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Question:

A diesel engine has a compression ratio of 14 and cut-off takes place at 6% of stroke. Find the air standard efficiency.

Answer:

(b) The air std. efficiency of diesel cycle

$$\eta = 1 - \frac{1}{r_c^{r-1}} \left[\frac{e^r - 1}{r(e-1)} \right]$$

$$\begin{aligned} \text{Cut off ratio } e &= 1 + 0.06[r_c - 1] \\ &= 1 + 0.06[14 - 1] \\ &= \underline{\underline{1.78}} \end{aligned}$$

$$\begin{aligned} \eta &= 1 - \frac{1}{14^{1.4-1}} \left[\frac{1.78^{1.4} - 1}{1.4(1.78-1)} \right] \\ &= 1 - 0.34(1.478) \\ &= \underline{\underline{48.68\%}} \end{aligned}$$

