

## FORENOON

Solution that should be challenged by students for GATE 2024 CIVIL

45. Question ID (6420084766) [NAT, 2 Marks]

The following data is obtained from an axle load survey at a site:

Average rear axle load = 12000 kg

Number of commercial vehicles = 800 per day

The pavement at this site would be reconstructed over a period of 5 years from the date of survey. The design life of the reconstructed pavement is 15 years. Use the standard axle load as 8160 kg and the annual average vehicle growth rate as 4.0%. Assume that Equivalent Wheel Load Factor (EWLF) and Vehicle Damage Factor (VDF) are equal.

The cumulative standard axle (in msa) for the pavement design is \_\_\_\_\_ (rounded off to 2 decimal places).

Sol. (33.27)

$$VDF = EWLF = \left( \frac{\text{Axle load}}{\text{Standard axle load}} \right)^4 = \left( \frac{12000}{8160} \right)^4 = 4.677$$

$$A = P(1 + r)^x = 800(1.04)^5 = 973.322$$

$$\begin{aligned} CSA &= \frac{365A((1+r)^n - 1)}{r} \text{LDF} \times VDF \\ &= \frac{365 \times 973.322[1.04^{15} - 1]}{0.04} \times 1 \times 4.677 \\ &= 33.27 \text{ msa} \end{aligned}$$

Assuming LDF to be 1.

As number of lane is not mentioned in the question, it has been solved assuming single lane...