

Moderate

Assistant Engineer (Electrical), Class II

2025

Building Department

20 MW, 50 Hz

- A

40.75
- B

48.75
- C

49.75

Correct
- D

50.25

Correct Answer: C

Full Detailed Explanation

$$P = 20 \text{ MW} = 20 \times 10^6 \text{ W}$$
$$V = 2.5 \text{ kV} = 2.5 \times 10^3 \text{ V}$$
$$I = \frac{P}{V} = \frac{20 \times 10^6}{2.5 \times 10^3} = 8000 \text{ A}$$
$$R = \frac{V}{I} = \frac{2.5 \times 10^3}{8000} = 0.3125 \text{ }\Omega$$
$$f = 50 \text{ Hz}$$
$$X_L = 2\pi fL = 2\pi \times 50 \times 0.3125 = 98.175 \text{ }\Omega$$
$$Z = \sqrt{R^2 + X_L^2} = \sqrt{0.3125^2 + 98.175^2} = 98.175 \text{ }\Omega$$
$$I = \frac{V}{Z} = \frac{2.5 \times 10^3}{98.175} = 25.46 \text{ A}$$
$$P = I^2 R = (25.46)^2 \times 0.3125 = 2000 \text{ W} = 2 \text{ kW}$$
$$f = 50 \text{ Hz}$$