

1. The EDFA amplifier produces a signal output power ($P_{s, out}$) is 27 dBm for an input level of 2 dBm at 1542 nm. Find the amplifier gain (G) in dB & minimum pump power required (in mW) at 1475 nm.

$$\rightarrow \text{dBm} = 10 \log \frac{P}{1 \text{ mW.}}$$

$$27 \text{ dBm} = 10 \log \frac{P_{out}}{1 \text{ mW.}}$$

$$P_{out} = 501 \text{ mW.}$$

$$2 \text{ dBm} = 10 \log \frac{P_{in}}{1 \text{ mW.}}$$

$$P_{in} = 1.6 \text{ mW.}$$

$$G (\text{in dB}) = 10 \log \left[\frac{501}{1.6} \right] = 25 \text{ dB.}$$

Minimum pump power:

$$501 \leq 1.6 + \frac{1475}{1542} P_{p, in}$$

$$P_{p, in} = 522.3 \text{ mW.}$$