5. If we make the units explicit, the function is

$$\theta = 2\,\text{rad} + \left(4\,\text{rad/s}^2\right) t^2 + \left(2\,\text{rad/s}^3\right) t^3$$

but in some places we will proceed as indicated in the problem – by letting these units be understood.

(a) We evaluate the function θ at $t = 0$ to obtain $\theta_0 = 2$ rad.

(b) The angular velocity as a function of time is given by Eq. 11-6:

$$\omega = \frac{d\theta}{dt} = \left(8\,\text{rad/s}^2\right) t + \left(6\,\text{rad/s}^3\right) t^2$$

which we evaluate at $t = 0$ to obtain $\omega_0 = 0$.

(c) For $t = 4$ s, the function found in the previous part is $\omega_4 = (8)(4) + (6)(4)^2 = 128$ rad/s. If we round this to two figures, we obtain $\omega_4 \approx 130$ rad/s.

(d) The angular acceleration as a function of time is given by Eq. 11-8:

$$\alpha = \frac{d\omega}{dt} = 8\,\text{rad/s}^2 + \left(12\,\text{rad/s}^3\right) t$$

which yields $\alpha_2 = 8 + (12)(2) = 32\,\text{rad/s}^2$ at $t = 2$ s.

(e) The angular acceleration, given by the function obtained in the previous part, depends on time; it is not constant.