# Comprehension Questions - Module 14: Gene Expression

## Gene Regulation Overview

1. Explain why gene regulation is essential for cell function and development.
2. Compare and contrast the different levels at which gene expression can be controlled.
3. How do cells express different genes to become different cell types?

## Prokaryotic Gene Regulation

1. Explain how the lac operon works and why it is an example of inducible gene expression.
2. Describe how repressors and activators control gene expression in prokaryotes.
3. Compare and contrast inducible and repressible operons.

## Eukaryotic Gene Regulation

1. Explain how chromatin structure affects gene expression in eukaryotes.
2. Describe the role of transcription factors in controlling gene expression.
3. Explain how alternative RNA splicing increases protein diversity.
4. How do enhancers and silencers regulate gene expression?

## Post-Transcriptional Regulation

1. Explain how mRNA stability affects gene expression.
2. Describe mechanisms of post-translational regulation of gene expression.

3. How do microRNAs regulate gene expression?

## Development and Gene Expression

1. Explain how gene expression patterns control development and cell differentiation.
2. Describe how homeotic genes control body plan development.
3. How do cells maintain their identity through gene expression patterns?

## Epigenetics

1. Explain what epigenetics is and how it differs from genetic changes.
2. Describe how environmental factors can influence gene expression through epigenetic mechanisms.