



## Final Semester Exam



Department: Zoology  
Time: 2 Hours  
Date: 9 . 01 . 2023

Major: molecular biology  
program  
(fifth semester students)

Course Title: Cell differentiation  
& tissue culture  
Code number: 303 Z  
Mark: 90

**Answer the Following Questions:** :

**Question One:** (15 Marks)

Classify cells in terms of the following:

- Cell ability to differentiate
- Cell ability to divide.
- Cell culturing.

**Question Two:** (30 marks)

Sox2, Oct3/4, Nanog, KLF4!

- What are those above-mentioned molecules and what is their function?
- What is the product if a somatic cell transfected with some of those molecules?
- Does the differentiation of this product resemble that of embryonic or adult stem cells? Explain?
- Give an example of this differentiation process.

**Question Three:** (30 marks)

Although embryonic stem cells are advantageous in culture and differentiation over other stem cell types, yet their clinical application is almost impossible.

- Why?
- What are their advantages?
- Why are mesenchymal stem cells more advantageous?
- Describe the differentiation technique of both types

**Question Four:** (15 marks)

**Describe in details:**

- Three solutions used in tissue culture.
- Three devices used in tissue culture.
- Steps of cell passaging.

*Best Wishes*  
*Prof. Ayman Hyder*