# United International University

## School of Science and Engineering

Mid-term Examination; Year 2022; Trimester: Summer
Course: BIO 3105; Title: Biology for Engineers; Sec: A-C
Full Marks: 30; Time: 1 hr 45 mins

*There are Five Questions, **1, 2, and 3 are mandatory** to answer, and answer **4 or 5** (anyone).*

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| 1. | (a) Define biological engineering. | 1 | CO1 |
| | (b) Describe the value of biology knowledge for computer science students. | 2 | CO1 |
| | (c) Describe why eukaryotic cells have flexible cell membranes. | 2 | CO1 |
| | (d) Describe the central dogma of life. | 2 | CO1 |
| 2. | (a) Suppose you have a pond where you want to grow fishes. Can you design a biorobot that can potentially help you to reduce the expenditure on manpower? Is that possible to use your expertise in this case? | 3 | CO2 |
| | (b) The dominant gene for noses creates a broad nose, while a recessive gene creates a narrow one. If you see 75% of the second generation children have broad noses, what were the traits of the actual parents (2 generations before)? | 3 | CO2 |
| | (c) DNA molecules have length in meter scale where a cell is in mm, or µm. How do you think a DNA can be fitted inside such a tiny cell? | 2 | CO2 |
| 3. | (a) Can you design a project in the field of modern biology using your own background? Explain briefly about the project and how you can implement your expertise there. | 3 | CO3 |
| | (b) Short height and abnormal formation of arms are two symptoms of down syndrome. From your understanding the classification of chromosomal abnormalities comment on how you would differentiate aneuploidy from the above mentioned symptoms. | 3 | CO3 |
| | (c) Eukaryotes and prokaryotes have their differences in the structural units, which are cells. Find out the differences between such two types of cells. | 2 | CO3 |
| 4. | (a) Give logical explanation on how a degraded ecosystem affects the ecosystem core? | 3 | CO4 |
| | (b) Explain how nutrients are transported across cell membranes. A brief description will be sufficient for the answer. | 4 | CO4 |
| 5. | (a) Do you think RNA could be your genetic material? Give logical explanations behind your answer. | 3 | CO4 |
| | (b) Explain where nuclear envelop dissolves and form in the mitosis. Differentiate the metaphase of meiosis 1 and mitosis. | 4 | CO4 |

CO1: Describe different biological quantities.
CO2: Apply the knowledge of biological systems in a real-life problem.
CO3: Design several biological systems with constraints.
CO4: Explain several procedures for solving biological systems within constraints.