UNIVERSITY OF RUHUNA

Faculty of Engineering

End-Semester 6 Examination in Engineering: July 2025

Module Number: CE6253 **Module Name: Ecological Engineering (C-18)**

[Three Hours]

[Answer **all questions**, each question carries TWELVE marks]

Q1. a) Ecosystem distribution is influenced by the climatic conditions prevailing in an area.

i) Describe the influence of latitude in determining ecosystem characteristics in a region.

[2 Marks]

ii) Explain how altitude variations could influence ecosystem characteristics, using the central highlands of Sri Lanka as an example.

[3 Marks]

b) Describe the characteristics of wetland ecosystems.

[3 Marks]

c) Discuss the importance of temperature as an environmental factor, considering the temperature dependence of physiological and biochemical reactions.

[4 Marks]

Q2. a) Describe the contribution of the following processes for maintaining the stability of the ecosystem.

i) Presence of biologically diverse plant and animal community

[3 Marks]

ii) Presence of predator-prey relationships

[3 Marks]

b) Human interactions with ecosystems have many negative impacts on ecosystems locally and globally. Discuss possible impacts of following human interactions on different components of biotic and abiotic environment.

i) Discharge of polyethylene and plastics to the environment

[3 Marks]

ii) Discharge of greenhouse gasses to the atmosphere

[3 Marks]

Q3. a) Constructed wetlands and floating wetlands have emerged as viable techniques for controlling water pollution at the global level.

i) Describe three pollutants removal mechanisms occur in constructed wetlands.

[3 Marks]

ii) Why harvesting is necessary in the maintenance of constructed wetlands?

[3 Marks]

iii) "It is recommended to have a water depth of 0.8–1.5 m in a water body if floating wetlands are to be maintained." Discuss this statement highlighting negative impacts of failure to maintain above conditions.

[3 Marks]

b) A floating constructed wetland system is to be constructed on an urban lake which is receiving storm water runoff. The depth of the urban lake is 1.5 m. Describe the functional benefits of introducing the floating constructed wetland.

[3 Marks]

Q4. Storm water management has become a critical focus in urban planning. Modern cities increasingly integrate green infrastructure to manage storm water.

a) Compare traditional and modern engineering practices in managing storm water in cities.

[3 Marks]

b) Discuss the advantages of using multiple low impact development techniques.

[3 Marks]

c) Discuss the role of urban green space designs in urban storm water management.

[3 Marks]

d) What types of community-supported urban storm water management techniques can be implemented in a small residential area?

[3 Marks]

Q5. a) In ecology, it is clearly stated that "Restoration is not a substitute for conservation." Critically analyze this statement, considering the limitations and challenges to face in ecosystem restoration.

[3 Marks]

b) Biotic factors influence the evolution and stability of ecosystems. Discuss how this influence is relevant to ecosystem restoration activities.

[3 Marks]

c) In a river restoration project, reactivating the natural flow regime and natural dynamics of the flood plain were the primary human intervened restoration activities. Based on your understanding in ecological engineering projects, discuss the subsequent results of above interventions in restoring the river ecosystem.

[6 Marks]