

**DIPLOMA IN SMART CITY
DEVELOPMENT AND MANAGEMENT
(DSCDM)**

Term-End Examination

June, 2023

**MIO-005 : SMART CITIES : SAFE WATER,
SANITATION AND SUSTAINABILITY**

Time : 3 Hours

Maximum Marks : 70

Note : Answer any **seven** of the following questions.

All questions carry equal marks.

1. (a) Discuss the sources for clean water. 5
(b) Explain the layers model of SWAN. 5
2. (a) What are the smart solutions for water management in city ? 5
(b) What are the steps to be taken to counter the threat conditions of water supply ? 5
3. (a) What is water auditing ? What are the components of water audit ? 6
(b) Explain the uses of smart metering of water. 4

4. (a) Write the objectives of treating water. 4
(b) What are the various processes used in advanced water treatment ? Explain briefly. 6
5. Discuss in detail separate sewerage system and combined sewerage system with advantages and limitations. 10
6. (a) Explain water carriage system to collect refuse. 5
(b) Differentiate between Infiltration and Exfiltration. 5
7. (a) What is Vermicomposting ? Discuss different types of vermicomposting in brief. 5
(b) What are microbial fuel cells (MFCs) ? 2
(c) Discuss different types of bio-energies briefly. 3
8. (a) Discuss the types of landfills in brief. 4
(b) Write the objectives of leachate management. What are the problems involved in treating the leachate ? 6
9. (a) Enlist the conventional value-added products. Explain the problems associated with conventional value-added products in brief. 6

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- (b) Discuss the different waste materials which could be used as construction materials. 4
10. (a) Write advantages and disadvantages of bio-pesticides. 3
- (b) Discuss the benefits of using bio-methanol as fuel. 3
- (c) Draw a neat sketch of the enzyme production flow diagram. 4