**20CE41E2 – SOLID WASTE MANAGEMENT**

**(Civil Engineering)**

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| **Course Category**  | Professional Elective | **Credits** | 3 |
| **Course Type** | Theory | **Lecture - Tutorial - Practical** | 3 - 0 - 0 |
| **Prerequisite** | None | **Sessional Evaluation** | 40 |
| **Semester End Exam Evaluation** | 60 |
| **Total Marks** | 100 |

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| **Course Outcomes** | CO1 | Know the impacts of solid waste generation |
| CO2 | Identify different sources of solid waste. |
| CO3 | Apply the onsite handling, processing techniques and transfer techniques. |
| CO4 | Apply processing techniques and recovery of products from solid waste. |
| CO5 | Know various disposal techniques and management options for solid waste. |
| CO6 | Identifies hazardous wastes and apply the disposal techniques. |
| **Course****Content** | **UNIT – I****INTRODUCTION:** Goals and objectives of solid waste management – Impacts of solid waste generation in a technological society – Principle of solid waste management – Social and economic aspects – Public awareness – Quantities of solid wastes.**UNIT –II****SOURCES AND TYPES OF MUNICIPAL SOLID WASTES:** Sources and types of solid wastes – Factors affecting generation of solid wastes – functional elements - Characteristics - Effects of improper disposal of solid wastes – Public health effects.**UNIT – III****ONSITE HANDLING – STORAGE AND PROCESSING:** Onsite handling –Methods used at residential and commercial sources –Onsite storage dust bins –Community containers, container locations, onsite processing methods**COLLECTION AND TRANSFER:** Methods of Collection – Types of vehicles – Manpower requirement – Collection routes –Transfer stations – Selection of location - Options under Indian conditions.**UNIT – IV****PROCESSING TECHNIQUES AND EQUIPMENT:** Purpose of processing- sorting - shreddingand incineration and types of incinerators.**RECOVERY OF PRODUCTS AND ENERGY:** Material processing and recovery systems –Recovery of chemical conversion products –Recovery of biological conversion products, recovery of energy from conversion products.**UNIT – V****DISPOSAL OF SOLID WASTES:** Sanitary landfills – General considerations –Site selection – Operational management systems in land fill – Gas and leachate control – construction –Ocean disposal of solid wastes – Application of GIS in Land Fill.**UNIT – VI****HAZARDOUS WASTES:** Special wastes - Hazardous wastes –Hospital wastes –Sewage sludge –Industrial solid wastes –Methodsof disposal. |
| **Textbooks****and****References** | **TEXTBOOKS:**1. Iqbal H Khan, NavedAhsan, *Textbook of Solid Wastes Management,*CBS publishers and distributors pvt ltd, 1st edition, 2017.
2. George Tchobanoglous& Hilary Theison,*Solid Waste: Engineering principles and management,* McGraw-Hill Publishers, 1993.
3. Bhide, A.D. and Sundaresam B.B, *Solid Waste Management in developing countries*, Indian National Scientific Documentation Centre, 2016.

**REFERENCE BOOKS:**1. Datta.MParida&B S GuhaB.K.andSreekrishna. T. R, *Industrial Solid Waste Management & Land Filling Practice,* Narosa publishing house, 2001
2. K. Sasi kumar and SanoopGopi Krishna, *Solid Waste Management,* PHI publishers, 2013.
3. [RajaramVasudevan,](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_1?ie=UTF8&field-author=Rajaram+Vasudevan+&text=Rajaram+Vasudevan+&sort=relevancerank&search-alias=digital-text)[Siddiqui Faisal Zia](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_2?ie=UTF8&field-author=Siddiqui+Faisal+Zia&text=Siddiqui+Faisal+Zia&sort=relevancerank&search-alias=digital-text), [SanjeevAgrawal](https://www.amazon.in/s/ref%3Ddp_byline_sr_ebooks_3?ie=UTF8&field-author=Sanjeev+Agrawal&text=Sanjeev+Agrawal&sort=relevancerank&search-alias=digital-text)&  Mohmmad Imran Khan, *Solid And Liquid Waste Management*, PHI publishers.
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**CO-PO Mapping:** 3-High Mapping, 2-Moderate Mapping, 1-Low Mapping, - -Not Mapping

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|  | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | 1 | 1 | - | - | 1 | 3 | 3 | 3 | 2 | 3 | 1 | 3 | - | - | - |
| **CO2** | - | 2 | 1 | - | - | 3 | 2 | 3 | 2 | 2 | 2 | 1 | - | - | 1 |
| **CO3** | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | - | 2 | 2 |
| **CO4** | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 2 | 3 | - | 2 | 2 |
| **CO5** | 1 | 1 | 2 | 1 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 1 |
| **CO6** | 2 | 2 | - | - | 2 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | - | - | 1 |