CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

M.Tech. in Civil Engg. with Specialization in Environmental & Water Resources Engineering

Course of Study				M.Tech. Third Semester							
S. No.	Board of Study	Subject Code	Subject Name	Periods per week			Scheme of Examination			Total Marks	Credits L+T+P/ 2
							Theory/Practical				
				L	T	P	ESE	CT	TA		
1	Civil Engg.	504311 (20)	Eco-Hydrology & Eco-Technology	3	1	-	100	20	20	140	4
2	**Refer Table-III**		**Elective-III**	3	1	-	100	20	20	140	4
3	Civil Engg.	504321 (20)	Preliminary work on Dissertation	-	-	28	100	-	100	200	14
4	Civil Engg.	504322 (20)	Seminar Based on Dissertation	-	-	3	-	-	20	200	2
Total				**6**	**2**	**31**	**300**	**40**	**180**	**600**	**24**

L: Lecture T: Tutorial

P: Practical ESE: End Semester Exam

CT: Class Test TA: Teacher's Assessment

Table–III

List of Elective–III Subjects		
S.No.	**Subject Code**	**Subject Name**
1	504331 (20)	Solid Waste Management
2	504332 (20)	Climate Change Implication & Remedial Measures
3	504333 (20)	Irrigation Water Management

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: M.Tech - III | Branch: Civil Engg.
Subject: Eco-Hydrology & Eco-Technology | Code: 504311 (20)
Total Theory Period: 40 | Total Tutorial Period:12
Total Marks in End Semester Exam: 100
Minimum of class test to be conducted: 02

Prerequisites: Basic knowledge of environment and ecology, engineering hydrology is helpful.

Objectives: Gain insight into the balance between ecology and technology. Understand an eco-technological approach for design and operation.

Unit I

Aim, scope and applications of ecology - Development and evolution of ecosystems - Principles and concepts pertaining to communities in ecosystem - Energy flow and material cycling in ecosystems – productivity in ecosystems - Rationale of ecological engineering and eco technology - Classification of Eco-technology

Unit II

Uniform and Non-uniform flow in channels and sewers, Hydrologic cycle and its interaction with human activity, Atmospheric and subsurface water, Surface water, Hydrologic analysis, Hydrologic statistics.

Unit III

Basic concepts of ecosystem dynamics, eco designing, ecotechnological approaches, applications of eco technology for societal welfare and sustainable development

Unit IV

Wetland ecosystems ecological significance, natural purifying potential, Constructed Wetlands their design, structure, functioning, and applications.

Unit V

Restoration of degraded ecosystems using ecological approach: mined areas and wastelands Building resilience of ecosystems soil fertility management.

Expected Outcome: The Student will be able to know the principles, its type and different methods of Eco-Hydrology & Eco-Technology.

Text Books:

1. Mitsch, W.J. and Jorgensen, S.E. 1989. Ecological Engineering: An Introduction to Ecotechnology John Wiley & Sons, New York.
2. Kadlec, R.H., Knight, R.L. 1986. Treatment Wetlands Lewis Publishers, Boca Raton,FL.

3. Environmental Hydraulics of Open Channel Flows, Chanson H., Butterworth – Heinemann
4. Applied Hydrology, Chow, V.T., Maidment, D.R. and Mays, L.W., McGraw Hill Inc.
5. Open Channel Hydraulics, Chow, V.T., McGraw Hill Inc.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: M.Tech - III
Subject: Solid Waste Management
Total Theory Period: 40
Total Marks in End Semester Exam: 100
Minimum of class test to be conducted: 02

Branch: Civil Engg.
Code: 504331 (20)
Total Tutorial Period:12

Prerequisites: Basic knowledge of chemistry is helpful.

Objectives: Gain insight into the collection, transfer, and transport of municipal solid waste. Understand the design and operation of a municipal solid waste landfill, resource recovery facility and waste to energy facility.

Unit I

Municipal Solid Waste Management:
Legal and Organizational foundation: Definition of solid waste, waste generation, major legislation, monitoring responsibilities, sources and types of solid waste, sampling and characterization, Determination of composition of MSW, storage and handling of solid waste, Future changes in waste composition.

Unit II

Collection and Transport of Solid Waste:
Waste collection systems, analysis of collection system, alternative techniques for collection system. Need for transfer operation, transport means and methods, transfer station types and design requirements.

Unit III

Process of Solid Waste and Energy recovery:
Unit operations for separation and processing,Materials Recovery facilities, Waste transformation through combustion and aerobic composting, anaerobic methods for materials recovery and treatment Energy recovery, Incinerators

Unit IV

Disposal of Solid wastes-Land farming, deep well injections.Landfills: Design and operation including: site selection, Geo environmental investigations , engineered sites, liners and covers, leachate control and treatment, gas recovery and control, including utilization of recovered gas (energy), and landfill monitoring and reclamation, , Requirements and technical solution

Unit V

Designated waste landfill remediation. Integrated waste management facilities. TCLP tests and leachate studies. Economics of the on-site v/s off site waste management options. Natural attenuation process and its mechanisms.

References:

1. Handbook of Solid Waste Management by Frank Kreith, GeorgeTchobanoglous, McGraw Hill Publication
2. Bagchi, A., Design, Construction, and Monitoring of Landfills, (2nd Ed). Wiley Interscience, 1994. ISBN: 0471306819.
3. Sharma, H.D., and Lewis, S.P., Waste Containment Systems, Waste Stabilization, and Landfills: Design and Evaluation. Wiley Interscience, 1994. ISBN: 0471575364.
4. George Techobanoglous et al, "Integrated Solid Waste Management",McGraw Hill Publication, 1993.
5. Charles A. Wentz; " Hazardous Waste Management ", McGraw Hill Publication, 1995.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: M.Tech - III
Branch: Civil Engg.
Subject: Climate Change Implication & Remedial Measures
Code: 504332 (20)
Total Theory Period: 40
Total Tutorial Period: 12
Total Marks in End Semester Exam: 100
Minimum of class test to be conducted: 02

Prerequisite: Basin knowledge of physics, mathematics and open channel flow.

Objective: Understanding of climate change phenomenon, and its modelling.

Unit I

Basics of Climate change study: Climate, weather and Climate Change; Overview of Earth's Atmosphere; Layers of Atmosphere; Temperature, Radiation and Variation; Heat-Balance of Earth Atmosphere System; Temporal Variation of Air temperature; Temperature Change in Soil; Thermal Time and Temperature Extremes, Hydrologic cycle, greenhouse effect.

Unit II

Climate Change: Introduction; Causes of Climate Change; Modelling of Climate Change, Global Climate Models, General Circulation Models, Downscaling; IPCC Scenarios, difference between climate change and climate variability.

Unit III

Statistical Methods in Hydro-climatology: Trend Analysis; Empirical Orthogonal Functions, Principal Component Analysis; Canonical Correlation; Statistical Downscaling with Regression.

Unit IV

Climate Variability: Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

Unit V

Effect of Climate change on low and high river flows: Trend analysis, climate change projections and its effect on stream flow generation. Effect of glacial retreat on stream flow.Sea level rise, salt water intrusion.

Expected outcome: Able to use different Climate models, statistical downscaling and its application on river flows.

Recommended Books:

1. Burde, G. I., A. Zangvil, 2001: The Estimation of Regional Precipitation Recycling. Part I: Review of Recycling Models. *J. Climate*,14, 2497–2508.
2. H.vonstorch, A.Navarra, Analysis of Climate Variability, 2nd Edition Springer-Verlag Berlin Heidelberg New York 1999.
3. Von Storch and Zwiers F W, Statistical Analysis in Climatic Research, Cambridge, 1999.
4. McGuffie, K. and Henderson-Sellers, A Climate Modeling Primer, Wily, 2005.
   IPCC Assessment Report-2015.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: M.Tech - III
Subject: Irrigation Water Management
Total Theory Period: 40
Total Marks in End Semester Exam: 100
Minimum of class test to be conducted: 02

Branch: Civil Engg.
Code: 504333 (20)
Total Tutorial Period: 12

Prerequisite: Basic knowledge of hydrology, open channel flow, and soil mechanics.
Objective: To impart knowledge and skills in basic principles and design of irrigation system.

Unit I

Soil water plant relationship, Irrigation requirements, Irrigation efficiencies. Design of conventional and modern methods of irrigation, Macro-irrigation systems: design of level border, graded border and furrow irrigation systems.

Unit II

Adaptability, advantages, drawbacks, tank and well irrigation systems. Micro-irrigation systems: planning and design of sprinkler and drip irrigation systems.

Unit III

Irrigation of arid lands, Drainage of irrigated land, Salinity of soil, Salinity control, Quality of irrigation water, Contaminants and their effects on various crop types.

Unit IV

Planning and operation of irrigation systems, Conjunctive use of water, Salinity and alkalinity management. Participatory irrigation management, Water management policy

Unit V

EIA and Socio-economic impacts of irrigation project. Different Water Distribution system.

Expected outcome: The Student will be able to know the principles of irrigation, its type and different methods of irrigation.

Texts/Reference Books:

1. Irrigation and Hydraulics Structure, S K Garge, Khanna Publishers
2. Irrigation and Hydraulics Structures, B C Punamia, Laxmi Publishers
3. Irrigation, Hydraulic Structures and Water Power Engineering – K. R. Arora, Standard Publishers and Distributers, Delhi-6.
4. Handbook of Drainage of irrigated areas in India, LBII/WAPCOS (India) Ltd, TechnicalReportno. 5. New Delhi, March 1988.
5. Handbook of irrigation Technology, Vol. II, Hermah J. Finkel, CRC press, Inc. Boca Raton, Florida.