गुरु घासीदास विश्वविद्यालय
(केन्द्रीय विश्वविद्यालय अधिनियम 2009 क्र. 25 के अंतर्गत स्थापित केन्द्रीय विश्वविद्यालय)
कोनी, बिलासपुर - 495009 (छ.ग.)

Guru Ghasidas Vishwavidyalaya
(A Central University Established by the Central Universities Act 2009 No. 25 of 2009)
Koni, Bilaspur – 495009 (C.G.)

List of Courses which focuses on Professional Ethics, Gender, Human Values, Environment & Sustainability and other value framework

Department : *Chemical Engineering*

Programme Name : *B.Tech.*

Academic Year : 2024-25

Courses which focuses on Professional Ethics, Gender, Human Values, Environment & Sustainability and other value framework:

Sr. No.	Course Code	Name of the Course
01.	FOUATC2	Environmental Science and Ecology
02.	LAUATC1	Indian Constitution
03.	CHUBTH2	Human Values and Ethics
04.	NSUBLS1	NSS
05.	CHUCTK2	Water Treatment and Management
06.	CHUDTO1	ENERGY AND ENVIRONMENT
07.	CHPATP1	Advanced Wastewater Treatment Technology
08.	CHPBTO6	Waste to Energy
09.	LAPBTX4	Constitution of India

Scheme and Syllabus

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY

Scheme of Teaching and Evaluation 2022-2023 (As per NEP-2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
(Effective from the Academic Year 2022–2023)

I-SEMESTER BTech Mechanical/IP/Chemical/Civil Engineering

S.N.	Course Code	Course Title	Teaching Hours/week			Examination				Credits
			Theory/Lectures	Tutorial	Practical/ Drawing	Examination in Hours	CIA Marks	SEA Marks	Total Marks	
			L	T	P					
1	AMUATB1	Engineering Mathematics - A	3	1	-	03	40	60	100	4
2	CYUATB3	Engineering Chemistry	3	-	-	03	40	60	100	3
3	ECUATE4	Basic Electrical and Electronics Engineering	3	-	-	03	40	60	100	3
4	FOUATC2	Environmental Science and Ecology	2	-	-	03	40	60	100	2
5	CSUATE5	Computer Programming	3	-	-	03	40	60	100	3
6	LAUATC1	Indian Constitution	1	-	-	01	50	-	50	1
7	CYUALB3	Engineering Chemistry Laboratory	-	-	2	03	25	25	50	1
8	CSUALE5	Computer Programming Laboratory	-	-	2	03	25	25	50	1
9	IPUALL2	Engineering Workshop Practices	-	-	2	03	25	25	50	1
10	PEUALS2	Sports and Yoga	-	-	2		25	25	50	1
		Total	**15**	**1**	**08**	**25**	**350**	**400**	**750**	**20**

Note: AM:Mathematics, PP:Physics, ME: Mechanical Engineering, IP: Industrial & Production Engineering, CE: Civil Engineering, CS: Computer Sc. & Engg., IT: Information Technology, PE: Physical Education, FO: Forestry, LA: Law, NS: NSS, U: Undergraduate, T: Theory, L: Laboratory,

BASIC SCIENCE (B)	ENGINEERING SCIENCE (E)	SKILL ENHANCEMENT COURSE (L)	HUMANITIES SCIENCE (H)	MANDATORY COURSE (C)	EXTRA-CURRICULAR ACTIVITIES (S)
1. Mathematics – A 2. Physics 3. Chemistry 4. Mathematics - B	1. Engineering Mechanics 2. Introduction to Information Technology 3. Basic Electrical Engineering 4. Basic Electrical and Electronics Engineering 5. Computer Programming 6. Basic Communication Engineering	1. Engineering Graphics 2. Engineering Workshop Practices	1. English for communication 2. Human Values and Ethics	1. Indian Constitution 2. Environmental Science & Ecology	1. NSS 2. Sports and Yoga

Credit Definition:

- ≥1-hour lecture (L) per week per semester = 1Credit
- ≥1-hour tutorial (T) per week per semester = 1Credit
- ≥2-hour Practical/Drawing(P) per week per semester = 1 Credit

- **Four credit** courses are to be designed for **50** hours of Teaching-Learning process.
- **Three credit** courses are to be designed for **40** hours of Teaching-Learning process.
- **Two credit** courses are to be designed for **30** hours of Teaching-Learning process.
- **One credit** courses are to be designed for **15** hours of Teaching-Learning process.

Note: The above is applicable only to THEORY courses

AICTE Activity Points to be earned by students admitted to B.Tech., programme (For more details refer to Chapter 6, AICTE Activity Point Programme, Model Internship Guidelines):
Over and above the academic grades, every regular student admitted to the 4 years Degree program and every student entering 4years Degree programme through lateral entry, shall earn 100 and 75 Activity Points respectively for the award of degree through AICTE Activity Point Programme. The Activity Points earned shall be reflected on the student's eighth semester Grade Card.
The activities can be spread over the years, any time during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) donot affect SGPA/CGPA and shall not be considered for vertical progression.

Eligibility for UG Certificate:

A. **Undergraduate Certificate course will be offered by all departments of SoS(E&T), GGV.**
B. **For applicability of UG Certificate, the candidate who wants to exit after completing 1st year (02 semesters) BTech degree with 10 credits of skill-based courses lasting two months, including atleast 06 credits job specific internship/apprenticeship with NHEQF level 5/UCF level 4.5.**
C. **A student shall report to the concerned Head on or before the date notified by the Department/School/University, if he/she is interested to exit with UG Certificate**

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
Subject Code:	FOUATC2	L	T	P	CT-1	CT-II	Attendance & Assignments	TOTAL	60	100	02
Subject:	ENVIRONMENTAL SCIENCE AND ECOLOGY	2	-	-	15	15	10	40			

Course Content

UNIT – I

Introduction: Environment - Components of Environment Ecosystem: Types & Structure of Ecosystem, Balanced ecosystem Human Activities – Food, Shelter, Economic & Social Security.
Definition, Scope and basic principles of ecology and environment, Fundamentals of Ecology and Ecosystem – Structural and Functional Components. Food chain & Food webs. Ecological pyramids; Energy flow

UNIT – II

Air Pollution & Automobile Pollution: Definition, Effects – Global Warming, Acid rain & Ozone layer depletion, controlling measures.

UNIT-III

Solid Waste Management, E - Waste Management & Biomedical Waste Management - Sources, Characteristics & Disposal methods.

UNIT – IV

Natural Resources, Water resources – Availability & Quality aspects, Water borne diseases & water induced diseases, Fluoride problem in drinking water, Mineral resources, Forest Wealth, Material Cycles – Carbon Cycle, Nitrogen Cycle & Sulphur Cycle.

UNIT-V

Energy – Different types of energy, Conventional sources & Non Conventional sources of energy: solar energy, Hydro electric energy, Wind Energy, Nuclear energy, Biomass & Biogas Fossil Fuels, Hydrogen as an alternative energy.

Text Books

1. Fundamentals of Ecology (3rd Ed.) 2001- MC Dash, Tata - McGraw Hill, New Delhi.
2. Introduction to Environmental Engg. (1991). - GM Masters, Prentice Hall of India.
3. Benny Joseph (2005), "Environmental Studies", Tata McGraw – Hill Publishing Company Limited.
4. R.J.Ranjit Daniels and Jagadish Krishnaswamy, (2009), "Environmental Studies",Wiley India Private Ltd., New Delhi.
5. R Rajagopalan, "Environmental Studies – From Crisis to Cure",Oxford University Press, 2005.
6. Aloka Debi, "Environmental Science and Engineering", Universities Press (India) Pvt. Ltd. 2012

SYLLABUS	(SEMESTER-I)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
Subject Code:	LAUATC1	L	T	P	CT-1	CT-II	Attendance & Assignments	TOTAL			
Subject:	INDIAN CONSTITUTION	1	-	-	20	20	10	50	-	50	01

Course Learning Objectives:

- To the importance of preamble of the constitution of India.
- To understand the fundamental rights and duty as a citizen of India.
- To understand the functioning of union and state government and their inter-relationship.

Course Content:

UNIT 1: Introduction: Constitution-meaning of the term, Sources and constitutional theory, Features, Citizenship. Preamble.

UNIT 2: Fundamental Rights and Duties: Fundamental Rights, Fundamental Duties, Directive Principles of State Policy

UNIT 3: Union Government: Structure of Indian Union: Federalism, Centre-State relationship President: Role. Power and position, Prime Minister and council of ministers, Cabinet and Central Secretariat, Lok Sabha. Rajya Sabha

UNIT 4: State Government: Governor: Role and position, Chief Minister and council of ministers, State Secretariat

UNIT 5: Relationship between Centre and States: Distribution of Legislative Powers, Administrative Relations, Coordination between States

Textbooks/References:

1. Constitution of India, V.N. Shukla
2. The Constitutional Law of India, J.N. Pandey
3. Indian Constitutional Law. M.P. Jain

Course Outcome: At the end of the course students will be able to:

- Describe the salient features of the Indian Constitution
- List the Fundamental Rights and Fundamental Duties of Indian citizens
- Describe the Directive Principles of State Policy and their significance

SCHOOL OF STUDIES OF ENGINEERING AND TECHNOLOGY

Scheme of Teaching and Evaluation 2022-2023 (As per NEP-2020)
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
(Effective from the Academic Year 2022–2023)

II-SEMESTER BTech Mechanical/IP/Chemical/Civil Engineering

S.N.	Course Code	Course Title	Teaching Hours/week			Examination				Credits
			Theory lectures	Tutorial	Practical/ Drawing	Examination in Hours	CIA Marks	SEA Marks	Total Marks	
			L	T	P					
1	AMUBTB4	Engineering Mathematics-B	3	1	-	03	40	60	100	4
2	PPUBTB2	Engineering Physics	3	1	-	03	40	60	100	4
3	ITUBTE2	Introduction to Information Technology	3	-	-	03	40	60	100	3
4	ELUBTH1	English for Communication	3	-	-	03	40	60	100	3
5	CEUBTE1	Engineering Mechanics	3	-	-	03	40	60	100	3
6	ME UBTH2/CH UBTH2/ IP UBTH2/CEUBTH2	Human Values and Ethics	1	-	-	02	50	-	50	1
7	PPUBLB2	Engineering Physics Laboratory	-	-	2	03	25	25	50	1
8	CEUBLE1	Engineering Mechanics Laboratory	-	-	2	03	25	25	50	1
9	MEUBLL1	Engineering Graphics	1	-	3	03	25	25	50	3
10	NSUBLS1	NSS	-	-	2	01	25	25	50	1
		Total	**17**	**2**	**09**	**27**	**350**	**400**	**750**	**24**

Note: AM:Mathematics, PP:Physics, ME: Mechanical Engineering, IP: Industrial & Production Engineering, CE: Civil Engineering, CS: Computer Sc. & Engg., IT: Information Technology, PE: Physical Education, NS: NSS, U: Undergraduate, T: Theory, L: Laboratory,

BASIC SCIENCE (B)	ENGINEERING SCIENCE (E)	SKILL ENHANCEMENT COURSE (L)	HUMANITIES SCIENCE (H)	MANDATORY COURSE (C)	EXTRA-CURRICULAR ACTIVITIES (S)
1. Mathematics – A 2. Physics 3. Chemistry 4. Mathematics - B	1. Engineering Mechanics 2. Introduction to Information Technology 3. Basic Electrical Engineering 4. Basic Electrical and Electronics Engineering 5. Computer Programming 6. Basic Communication Engineering	1. Engineering Graphics 2. Engineering Workshop Practices	1. English for communication 2. Human Values and Ethics	1. Indian Constitution 2. Environmental Science & Ecology	1. NSS 2. Sports and Yoga

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The activities can be spread over the years, any time during the semester weekends and holidays, as per the liking and convenience of the student from the year of entry to the programme. However, the minimum hours' requirement should be fulfilled. Activity Points (non-credit) donot affect SGPA/CGPA and shall not be considered for vertical progression.

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A. **Undergraduate Certificate course will be offered by all departments of SoS(E&T), GGV.**
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C. **A student shall report to the concerned Head on or before the date notified by the Department/School/University, if he/she is interested to exit with UG Certificate**

SYLLABUS	(SEMESTER-II)	Periods/ Week			Internal Assessment (IA)				ESE	Grand Total	Credits
Subject Code:	MEUBTH2 (for Mech) CHUBTH2 (for Chem) IPUBTH2 (for IPE) CEUBTH2(for Civil)	L	T	P	CT-I	CT-II	Attendance & Assignments	TOTAL	-	50	01
Subject:	HUMAN VALUES AND ETHICS	1	-	-	20	20	10	50			

COURSE OBJECTIVE:

1. To create an awareness on Engineering Ethics and Human Values.
2. To understand social responsibility of an engineer.
3. To appreciate ethical dilemma while discharging duties in professional life.

COURSE OUTCOME:

On completion of this course, the students will be able to

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession
2. Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
3. Understand the role of a human being in ensuring harmony in society and nature.
4. Distinguish between ethical and unethical practices, and start working out the strategy to actualize a harmonious environment wherever they work.

COURSE CONTENT:

UNIT I: Introduction to Value Education

1. Value Education, Definition, Concept and Need for Value Education.
2. The Content and Process of Value Education.
3. Basic Guidelines for Value Education.
4. Self exploration as a means of Value Education.
5. Happiness and Prosperity as parts of Value Education.

UNIT II: Harmony in the Human Being

1. Human Being is more than just the Body.
2. Harmony of the Self ('I') with the Body.
3. Understanding Myself as Co-existence of the Self and the Body.
4. Understanding Needs of the Self and the needs of the Body.
5. Understanding the activities in the Self and the activities in the Body.

UNIT III: Harmony in the Family and Society and Harmony in the Nature

1. Family as a basic unit of Human Interaction and Values in Relationships.
2. The Basics for Respect and today's Crisis: Affection, e, Guidance, Reverence, Glory, Gratitude and Love.
3. Comprehensive Human Goal: The Five Dimensions of Human Endeavour.
4. Harmony in Nature: The Four Orders in Nature.
5. The Holistic Perception of Harmony in Existence.

UNIT IV: Social Ethics

1. The Basics for Ethical Human Conduct.
2. Defects in Ethical Human Conduct.

NSS

SYLLABUS	(SEMESTER-II)	Periods/ Week			INTERNAL ASSESSMENT (IA)			ESE Viva/ Assessment	Grand total	Credits
Subject Code:	NSUBLS1	L	T	P	Attendance	Activities	TOTAL			
Subject:	NSS	-	-	2	5	20	25	25	50	01

S.N.	PROGRAM HEADS	HOURS/SEM
1	Cleaning program	06
2	Plantation	06
3	Health Camp/Special Days celebration	10
4	Awareness program/Ralley	06

SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY
GURU GHASIDAS VISHWAVIDYALAYA, BILASPUR (C.G.)

(A Central University Established by the Central University Ordinance 2009, No. 3 of 2009)

SCHEME FOR EXAMINATION (Effective from Session 2023-24)

B. TECH. (FOUR YEAR) DEGREE COURSE, CHEMICAL ENGINEERING

SECOND YEAR, THIRD SEMESTER (NEP)

S. No.	Subject Code	Subject Name	Periods			Evaluation Scheme			Credits
						Sessional			
	THEORY		L	T	P	CIA	SEA	TOTAL	
01.	CHUCTT1	Fluid Mechanics	3	1	0	40	60	100	4
02.	CHUCTT2	Chemical Engineering Thermodynamics	3	1	0	40	60	100	4
03.	CHUCTT3	Material & Energy Balances	3	0	0	40	60	100	3
04.	CHUCTK1	Process Utilities & Safety	3	0	0	40	60	100	3
	CHUCTK2	Water Treatment and Management							
05.	AMUCTE1	Mathematics-III	3	0	0	40	60	100	3
06.	CHUCTO1	Engineering Materials	3	0	0	40	60	100	3
	CEUCTO1	Green Buildings							
	MEUCTO1	Introduction to Thermodynamics							
	IPUCTO1	I. C. Engine							
	CSUCTO1	Data Structure With C++							
	ITUCTO1	Computer Organization & Architecture							
	ECUCTO1	Data Communication							
	PRACTICAL								
01.	CHUCLT1	Basic Chemical Engineering Lab	0	0	2	25	25	50	1
02.	CHUCLT2	Fluid Mechanics Lab	0	0	2	25	25	50	1
		Total	18	2	4	290	410	700	22

CIA – Continuous Internal Assessment
SEA – Semester End Assessment

Total Credits – 22
Total Marks – 700
Total Periods / Week - 24

CIA-Shall be two class test (CT) I &II each 15 marks, 05 marks for assignment, surprise test, quiz etc. and 05 marks attendance
CH-Chemical Engineering, CE-Civil Engineering, ME-Mechanical Engineering, IT-Information Technology
IP-Industrial and Mechanical Engineering, CSE-Computer Science & engineering,
EC-Electronics and Communication Engineering

BoS Held on 06-10-2023

AUDTOI **Energy and Environment** **[L:3, T:0, P:0]**

Objectives

The objectives of this course are to introduce the basics of environment & ecosystem, different sources of pollution, its control measures and various energy resources. The course gives awareness about global environmental issues.

Contents:

Unit-I:
Introduction to Energy, Sources of Energy, Scenario of Energy, Conservation of Energy, Energy audit, Possibilities for energy storage or regeneration

Unit-II: Conventional and non-conventional energy sources and their uses. Fossil fuels - past, present & future, Remedies & alternatives for fossil fuels - Solar, Wind, Biomass, Hydrogen, Geothermal, Ocean and Hydro energy.

Unit-III : Components of environment and their relationship, impact of technology on environment, environmental degradation.
Global Environmental Issues: climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, and holocaust; Social Issues and the Environment.

Unit-IV : Overview of Environmental Pollution: Sources, effects, and control measures.

Unit-V: Environmental Legislation: Environmental protection laws in India; Air (Prevention and Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Issues involved in enforcement of environmental legislation; Public awareness; Case studies.

Suggested Text Books :

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha Second edition,2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.
2. Dr. Suresh K Damecha, Environemental Studies, S K Kataria & Sons, New Delhi.
3. R. Rajagopalan, Environemental Studies, Oxford University Press.
4. Robert A. Ristinen, Jack J. Kraushaar, Jeffrey Brack, Energy and the Environment, wiley Publication

Reference Book:

1. Wright Richard and Nebal Bernard, Environmental studies, Prentice Hall, New Jersey.
2. U K Khare, Basics of Environmental Studies, Tata McGrawHill
3. Daniel B Botkin& Edward Akeller, Environmental Sciences, John Wiley & Sons

Course Outcome:

Students would be able

1. To comprehend components of environment and ecosystem and to get aware about environmental degradation.
2. To identify different types of pollutions and control measures.
3. To create awareness about global environmental issues.

BOS held on 06/10/2017

DEPARTMENT OF CHEMICAL ENGINEERING
SCHOOL OF ENGINEERING & TECHNOLOGY, GGV, BILASPUR, C.G. (INDIA)
SCHEME OF EXAMINATION

M.TECH. CHEMICAL ENGINEERING

M.Tech. I-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CHPATT1	Advanced Heat Transfer	3	0	0	40	60	100	3
2.	CHPATT2	Advance Separation Process	3	0	0	40	60	100	3
3.	CHPATT3	Advanced Fluidization Engineering	3	0	0	40	60	100	3
4.	CHPATP1	Elective – I 1. Advance Reaction Engineering 2. Advanced Wastewater Treatment Technology 3. Advanced Chemical Process Modeling	3	0	0	40	60	100	3
5.	CHPATP2	Elective – II 1. Advanced Process Control 2. Process Intensification 3. Bioprocess Engineering	3	0	0	40	60	100	3
6.	CHPALT1	Chemical Engineering Computational Lab	0	0	4	30	20	50	2
7.	CHPATC1	Research Methodology and IPR	2	0	0	-	50	50	2
Total								600	19

M.Tech. II-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CHPBTT1	Advanced Transport Phenomena	3	0	0	40	60	100	3
2.	CHPBTT2	Chemical Reactor Design	3	0	0	40	60	100	3
3.	CHPBTP1	Elective – III 1. Computational Fluid Dynamics 2. Fuel Cell Technology 3. Process Plant Design & Flow Sheeting	3	0	0	40	60	100	3
4.	CHPBTP2	Elective – IV 1. Design & Development of Catalyst 2. Industrial Pollution Control 3. Safety Hazards & Risk Analysis	3	0	0	40	60	100	3
5	MSPBTO1 IPPBTO2 IPPBTO3 CEPBTO4 MEPBTO5 CHPBTO6 ECPBTO7 MCPBTO8 ITPBTO9 CSPBTO9	Open Elective 1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy 7. Internet of Things 8. MOOCs 9. Software Engineering Techniques 10. Enterprise Resource Management	3	0	0	40	60	100	3
6.	CHPBLT1	Advanced Chemical Engineering Lab	0	0	4	30	20	50	2
7.	CHPBPT1	Mini Project	0	0	4	30	20	50	2
8.	ELPBTX1 PEPBTX2 CEPBTX3 LAPBTX4	Audit Course/Value Added Course English for Research Paper Writing Stress Management by Yoga Disaster Management Constitution of India	2	0	0	0	0	0	0
Total								600	19

Note: Under MOOCs the students have to opt any subject other than Chemical Engineering from NPTEL/UGC SWAYAM

SUBJECT CODE	SUBJECT NAME	L:T:P	Credit
CHPATP1	ADVANCED WASTEWATER TREATMENT TECHNOLOGY	3:0:0	3

Course Objective:

- It encompasses water and wastewater analytical and instrumental methods of analysis.
- Design considerations of various unit operations and processes of water treatment facilities.
- Learn aeration, sedimentation, coagulation and flocculation processes. Able to explain settling equations.
- It also deals with biological sludge handling and treatment

Course Contents:

Introduction, Health and environment concern in wastewater management. Water quality: Definitions, characteristics and perspectives. The hydraulic cycle, Water quality, Physical, chemical and biological water quality parameters. Measurement of organic concentration, BOD, COD and TOC Test, reaction between BOD, COD, & TOC, Most probable number (MPN), Measurement of biological characteristics, Toxicity Test. Reactor used for transient of wastewater mass balance analysis, Modeling of ideal flow in reactor, Modeling of treatment process, Kinetic of processes, Process selection. Physical unit operations: Screening, mixing, Gravity separation, Primary sedimentation, Coagulation, Secondary treatment of waste water, adsorption. Biological waste water treatment, Micro-organism growth kinetics, modeling of suspended froth treatment process, Aerobic biological oxidation, Anaerobic process, heavy metal pollution remedies

Course Outcomes: At the end of the course, the student will be able to:

- Explain the need for wastewater treatment, categorize the wastewater based on characteristics, illustrate reactor types in wastewater treatment.
- Understand and apply the design principles and criteria in designing units such as screen, grit chamber, primary settling tank. Establish biokinetic constants in the engineering design of wastewater treatment processes.
- Describe the design criteria and design the suspended and attached growth biological wastewater treatment systems like activated sludge process, trickling filter.
- Plan and perform aerobic and anaerobic treatment processes on both domestic wastewater and industrial effluent.

Texts Books

- Metcalf and Eddy, Wastewater Engineering: Treatment And Reuse, Tata McGraw Hill publication, India.

SUBJECT CODE	SUBJECT NAME	L:T:P	Credit
CHPBTO6	WASTE TO ENERGY	3:0:0	3

Course outcomes: At the end of the course, students will be able to

1 Classify the waste for fuel and identify the devices for conversion of waste to energy.

2 Implement the Biomass Pyrolysis

3 Evaluate the methods of Biomass Gasification and implement their applications.

4 To design, construct and operation the Biomass Combustion devices.

5 Classify biomass, apply the bio energy systems design and construction.

Syllabus Contents:

- Introduction to Energy from Waste: Classification of waste as fuel – Agro based, Forest residue, Industrial waste - MSW – Conversion devices – Incinerators, gasifiers, digestors
- Biomass Pyrolysis: Pyrolysis – Types, slow, fast – Manufacture of charcoal – Methods - Yields and application – Manufacture of pyrolytic oils and gases, yields and applications.
- Biomass Gasification: Gasifiers – Fixed bed system – Downdraft and updraft gasifiers – Fluidized bed gasifiers – Design, construction and operation – Gasifier burner arrangement for thermal heating – Gasifier engine arrangement and electrical power – Equilibrium and kinetic consideration in gasifier operation.
- Biomass Combustion: Biomass stoves – Improved chullahs, types, some exotic designs, fixed bed combustors, Types, inclined grate combustors, Fluidized bed combustors, Design, construction and operation - Operation of all the above biomass combustors.
- Biogas: Properties of biogas (Calorific value and composition) - Biogas plant technology and status - Bio energy system - Design and constructional features - Biomass resources and their classification - Biomass conversion processes - Thermo chemical conversion - Direct combustion - biomass gasification - pyrolysis and liquefaction - biochemical conversion - anaerobic digestion - Types of biogas Plants – Applications - Alcohol production from biomass - Bio diesel production - Urban waste to energy conversion - Biomass energy programme in India.

References:

- Non-Conventional Energy, Desai, Ashok V., Wiley Eastern Ltd., 1990.
- Biogas Technology - A Practical Hand Book - Khandelwal, K. C. and Mahdi, S. S., Vol. I & II, Tata McGraw Hill Publishing Co. Ltd., 1983.
- Food, Feed and Fuel from Biomass, Challal, D. S., IBH Publishing Co. Pvt. Ltd., 1991.
- Biomass Conversion and Technology, C. Y. WereKo-Brobby and E. B. Hagan, John Wiley & Sons, 1996.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
	3	**10**	**10**	**11**	**1**	**5**	**3**	**3**	**12**	**5**	**12**	**12**	**3**	**2**	**1**
CO1	3	1	2	0	-	1	1	-	-	-	-	-	1	-	-
CO2	3	2	2	1	-	1	1	-	-	-	-	-	3	-	-
CO3	3	2	2	1	-	1	1	-	-	-	-	-	3	-	-
CO4	3	2	2	1	-	1	1	-		-	-	-	3	-	-
CO5	3	2	2	1	-	2	2	-	-	-	--	-	3	-	-

SUBJECT CODE	SUBJECT NAME	L:T:P	Audit
LAPBTX4	CONSTITUTION OF INDIA	2:0:0	2

Course outcomes: At the end of the course, students will be able to

1 Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

2 Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.

3 Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.

4 Discuss the passage of the Hindu Code Bill of 1956.

Syllabus Contents:

- History of Making of the Indian Constitution: History Drafting Committee, (Composition & Working).
- Philosophy of the Indian Constitution: Preamble, Salient Features
- Contours of Constitutional Rights & Duties: Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.
- Organs of Governance: Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, appointment and Transfer of Judges, Qualifications, Powers and Functions.
- Local Administration: District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CEO of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy.
- Election Commission: Election Commission: Role and Functioning, Chief Election Commissioner and Election Commissioners, State Election Commission: Role and Functioning, Institute and Bodies for the welfare of SC/ST/OBC and women.

References:

- The Constitution of India, 1950 (Bare Act), Government Publication.
- Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition, 2015.
- M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis, 2014.
- D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.