B.S. Abdur Rahman ™
Crescent
Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

ANNEXURE 1.3.1

1.3.1 The courses which address the Professional Ethics, Gender, Human Values, Environment and Sustainability in the Curriculum (Academic Year 2022-23)

PROFESSIONAL ETHICS

Programme Name	Course Code	Course Name
B.Tech. Civil Engineering	CECX 37	Engineering Ethics
B.Tech. Computer Science & Engineering	CSCX 210	Information Ethics
B.Tech. Computer Science & Engineering	CSCX 167	Cyber Laws and Ethics
B.Tech. Biotechnology	BTCX 20	Biosafety and Bioethics
B.Sc. Biotechnology	LSCX 114	Bioethics, IPR and Biosafety
B.A. Islamic Studies	ISD 1104	Guidance of Prophet - Moral & Ethics
B.A. Islamic Studies	ISCX 26	Islamic Ethics
B.A. English (Hons)	ENDX 51	Professional ethics
B.Arch.	AR C 4201	Professional Ethics and Practice – I
B.Arch.	AR C 5101	Professional Ethics and Practice-II
B.COM. LL.B (Hons.)	BLC 4202	Professional Ethics – Clinical Course 2
M.Tech. Structural Engineering	GEDY 115	Research and Publication Ethics
M.Tech. Biotechnology	LTDY 023	Bio Safety and Bioethics
M.Sc. Biotechnology	LSDY 101	Bio safety and Bioethics, Bio entrepreneurship and IPR
M.Com.	COCY 12	Ethics and Corporate Governance
B.Com. (General)	COCX 08	Business Ethics and Values
B.Com. (Hons.)	COC 3223	Governance, Ethics and Professional
BBA (General)	COCX 102	Corporate Governance and Ethics
BBA (Financial Services)	MSC 2109	Business Ethics and Values

GENDER, HUMAN VALUES

Programme Name	Course Code	Course Name
B.A. English (Hons)	ENCX 03	Feminist Writing
B.A. Islamic Studies	ISC 3123	Muslim Family Law
BBA LLB (Hons)	BLD 2102	Family Law-I
BBA LLB (Hons)	BLD 2202	Family Law II
M.Com.	COCY 102	Human Rights Education
M.Com.	COCY 105	Value in Social Life and Family
B.Com. (General) / B.Com (Accounts &	COC 3205	Value Education

ENVIRONMENT

Programme Name	Course Code	Course Name
B.Tech. Civil Engineering	GED 1206	Environmental Sciences
B.Tech. Civil Engineering	CEC 2215	Environmental Engineering Laboratory
B.Tech. Civil Engineering	CECX 18	Environmental Geotechnology
B.Tech. Civil Engineering	CECX 38	Environmental Risk Assessment

B.Tech. Civil Engineering	CECX 52	Environmental Impact Assessment
B.Tech. Civil Engineering	CECX 63	Environmental Monitoring
B.C.A.	GED 1207	Environmental Studies
B.Sc. Biotechnology	LSC 3105	Environmental Science
B.Sc. Biotechnology	LSDX 024	Environmental Biotechnology
B.Sc. Biotechnology	LSDX 025	Environmental Biotechnology
B.Sc. Biotechnology	LSCX 115	Environmental Biotechnology
B.Arch.	AR D 1101	History of Built Environment – I
B.Arch.	AR D 1203	Environment and Climatic Design
B.Arch.	AR C 2101	History of Built Environment - II
B.Arch.	AR C 2201	History of Built Environment - III
B.Arch.	AR C 3101	History of Built Environment- IV
B.Arch.	AR C 3201	Contemporary Built Environment
B.Des.	IAD 1105	Design Environment I
B.Des.	IAD 1204	Design Environment II
B. Pharmacy	BP 206T	Environmental sciences – Theory
M.Tech. Structural Engineering	CEDY 118	Separation Processes in Environmental Applications
M.Tech. Structural Engineering	CEDY 233	Green concepts in Building
M.Tech. Construction Engineering & Project	CEDY 231	Environment and Energy for Sustainable
M.Tech. Biotechnology	LTD 6205	Environmental Biotechnology
M.Arch	AR A Y109	Environmental Services
MBA	MSDY 097	International Trade and Economic Environment
M.Sc. Biotechnology	LSDY 105	Environmental Biotechnology
M.Sc. Microbiology	LSD 7123	Environmental and Medical Microbiology
M.Com.	COCY 08	Environmental Management and Green Marketing
B.Com. (General) / B.Com (Accounts & Finance)	COD 1103	Environmental Studies

SUSTAINABILITY

Programme Name	Course Code	Course Name
B.Tech. Civil Engineering	SSCX 04	Economics of Sustainable
B.Tech. Civil Engineering	GECX 201	Green Design and Sustainability
B.Arch.	AR C 4203	Green and Sustainable Design
B.Arch.	AR C 5211	Sustainable Architecture and
M.Tech. Structural Engineering	GEDY 102	Society, Technology and
M.Tech. Structural Engineering	GEDY 109	Principles of Sustainable
M.Tech. Construction Engineering & Project Management	CEDY 226	Sustainable Development
M.Tech. Construction Engineering & Project Management	CEDY 231	Environment and Energy for Sustainable
M.Tech. Construction Engineering & Project Management	CEDY 131	Sustainable Materials
M.Arch	AR A Y110	Sustainable Practices in Design

Courses relevant to Professional Ethics

CECX37	ENGINEERING ETHICS	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To enable the students to identify the core values that shapes the ethical behavior of an engineer.
- To enable the students to utilize opportunities to explore one's own values in ethical issues.
- To make the students aware of ethical concerns and conflicts.

To enhance familiarity with codes of conduct and increase the ability to recognize and resolve ethical dilemmas.

MODULE I ENGINEERING ETHICS 8

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Professions and Professionalism – Professional Ideals and Virtues – Uses of Ethical Theories.

MODULE II ENGINEERING AS SOCIAL EXPERIMENTATION 8

Engineering as Experimentation – Engineers as responsible Experimenters – Research Ethics - Codes of Ethics – Industrial Standards - A Balanced Outlook on Law – The Challenger Case Study.

MODULE III ENGINEER'S RESPONSIBILITY FOR SAFETY 8

Safety and Risk – Assessment of Safety and Risk – Risk Analysis – Reducing Risk – The Government Regulator's Approach to Risk - Case Studies Chernobyl and Bhopal disasters.

MODULE IV ETHICAL RESPONSIBILITIES 7

Collegiality and Loyalty – Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime

MODULE V ETHICAL RIGHTS 6

rofessional Rights – Employee Rights – Intellectual Property Rights (IPR) –

Discrimination

MODULE VI GLOBAL ISSUES 8

Multinational Corporations – Business Ethics - Environmental Ethics–ethics of technology– Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Honesty – Moral Leadership – Sample Code of Conduct.

Total Hours : 45

TEXT BOOKS:

1. Mike Martin and Roland Schinzinger, “Ethics in Engineering”, McGraw Hill, New York, 2005.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, “Engineering Ethics Concepts and Cases”, Thompson Learning, Belmont, CA, 2000.
3. Charles D. Fleddermann, “Engineering Ethics”, Prentice Hall, New Mexico, 1999.

REFERENCES:

1 John R. Boatright, “Ethics and the Conduct of Business”, Pearson Education, 2003.

2 Edmund G. Seebauer and Robert L. Barry, “Fundamentals of Ethics for Scientists and Engineers”, Oxford University Press, New York, 2001.

3 Bajaj, P.S., and Raj Agrawal, “Business Ethics – An Indian Perspective”, Biztantra, New Delhi, 2004.

4 David Ermann and Michele S. Shauf, “Computers, Ethics and Society”, Oxford University Press, New York, 2003.

OUTCOMES:

At the end of the course, the students will be:

- able to identify the core values that shape the ethical behavior of an engineer.
- aware of the ethical concerns and Standards.
- able to handle ethical dilemmas in a better way.
- able to maintain loyalty confidentiality, responsibilty and avoiding the areas where conflicts of interests arise.
- able to demonstrate the knowledge of ethical laws and intellectual rights.
- able to describe the ethical implications of emerging technologies

GEDY115	RESEARCH AND PUBLICATION ETHICS	L	T	P	C
		2	0	0	2

OBJECTIVES:

- To understand the philosophy of science and ethics, research integrity and publication ethics. To identify research misconduct and predatory publications.
- To understand indexing and citation databases, open access publications, research metrics (citations, h-index, impact Factor, etc.).
- To understand the usage of plagiarism tools.

MODULE I PHILOSOPHY AND ETHICS 4

Introduction to philosophy – definition - nature and scope – concept - branches – Ethics definition – moral philosophy – nature of moral judgements and reactions.

MODULE II SCIENTIFIC CONDUCT 4

Ethics with respect to science and research –. Intellectual honest and research integrity – Scientific misconducts – falsification, fabrication, and plagiarism – Redundant publications – duplicate and overlapping publications, salami slicing – Selective reporting and misrepresentation of data.

MODULE III PUBLICATION ETHICS 7

Publication ethics: definition, introduction and importance – Best practices/standards setting initiatives and guidelines: COPE, WAME, etc. –. Conflicts of interest – Publication misconduct: definition, concept, problems that lead to unethical behavior and vice verse, types – Violation of publication ethics, authorship and contributor ship – Identification of publication misconduct, complaints and appeals – Predatory publishers and journals.

PRACTICALS

OPEN ACCESS PUBLISHING 4

Open access publications and initiatives – SHERPA/RoMEO online resource to check publisher copyright and self-archiving policies – Software tool to identify predatory publications developed by SPPU – Journal finder/ journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

PUBLICATION MISCONDUCT **4**

Group Discussions – Subject specific ethical issues, FFP, authorship – Conflicts of interest – Complaints and appeals: examples and fraud from India and abroad – Software tools Use of plagiarism software – Turnitin, Urkund – other open source software tools.

DATABASESANDRESEARCHMETRICS **7**

Databases – Indexing Databases – Citation Databases – Web of Science Databases Scopus, etc.

Research Metrics – Impact Factor of journal as per journal citation report, SNIP, SJR, IPP, Cite Score –

Metrics: h-index, g index, i10 index, altmetrics

L – 15 ; P – 15 ; TOTAL HOURS –30

REFERENCES:

1. Bird, A. (2006). *Philosophy of Science.* Routledge.
2. Macintyre, Alasdair (1967) *A Short History of Ethics.* London.
3. P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978- 9387480865
4. National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). *On Being*
5. *A Scientist: A Guide to Responsible Conduct in Research: Third Edition.* National Academies Press. Resnik, D. B. (2011). What is ethics in research & why is it important. *National Institute of Environmental Health Sciences,* 1-10. Retrieved from https://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm
6. Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489(7415), 179-179. https://doi.org/10.1038/489179a
7. Indian National Science Academy (INSA), Ethics in Science Education, Research and Govemance(2019), ISBN:978-81-939482- l-7. http://www.insaindia.res.in/pdf/EthicsBook.pdf

OUTCOMES:

By the end of the course, the students will be able to

- Describe and apply theories and methods in ethics and research ethics
- Understand the overview of important issues in research ethics, like responsibility for research, ethical vetting, and scientific misconduct.
- Present arguments and results of ethical inquiries.

Courses relevant to Gender and Human Values

ENCX 03	FEMINIST WRITING	L	T	P	C
		3	1	0	4

OBJECTIVES:

- To enrich the students with a knowledge of feminist theory and criticism
- To create awareness among the students about the various perspectives of feminist writings

MODULE - I: Background History **12**

Overview of feminism, feminist theory and movements.

Mary Wollstonecraft – *A Vindication of the Rights of Woman* (Chapter 1 The Rights and Involved Duties of Mankind Considered)

Virginia Woolf - *A Room of One's Own* (Chapter 3- Why aren't there more great women writers to be found in history?)

MODULE - II: Poetry **10**

Kamala Das – "My Grandmother's House"

Adrienne Rich – "Snapshots of a Daughter-In-Law"

Maya Angelou – "Phenomenal Woman"

Elizabeth Barrett Browning – "Sonnets from the Portuguese" (Sonnet no. 33. Yes call me by my pet name! & 43. How do I love thee?)

MODULE - III: Drama **14**

ısan Glaspell – *Trifles*

Caryl Churchill – *Top Girls*

MODULE - IV: Short Stories **12**

Mahasweta Devi – "Draupadi"

Ambai – Selected stories from *A Purple Sea*

MODULE -V: Novels **12**

ManjuKapoor – *Difficult Daughters*

Margaret Atwood – *The Edible Woman*

TOTAL HOURS - 60

REFERENCES:

1. Jones, Chris. “The Vindications and their political tradition.” The Cambridge Companion to Mary Wollstonecraft. Ed. Claudia L. Johnson. Cambridge: Cambridge UP, 2002.
2. Rosenman, Ellen. *A Room of One's Own: Women Writers and the Politics of Creativity.* Twayne Publishing, Inc., New York, 1995.
3. Paul, Sumita, “The Mother-Daughter Conflict in ManjuKapur’s Difficult Daughters”, Indian Writing in the New Millennium, Ed. R.K.Dhawan, New Delhi: Indian Association for English Studies, 2000.
4. Atwood, Margaret. “An Introduction to The Edible Woman.” Second Words: Selected Critical Prose. Toronto: Anansi, 1982.
5. Satyanarayana. E. “The Unconquered: A Study of MahaswetaDevi"s Draupadi.” Indian Women Novelists: Set III. Ed. R.K. Dhawan. New Delhi: Prestige Books, 1995.

OUTCOMES:

- After the completion of the course, the students will be able to:
- Achieve a knowledge base about women’s role in history, their commitments, persecutions and resistance.
- Articulate how women’s studies and gender studies is a distinct field connected to other interdisciplinary fields of study.
- Categorize some of the developments, themes and narrative strategies of women writings.
- Distinguish women’s activist literary expressions.

BLD 2102	FAMILY LAW I	L	T	P	C
		3	1	0	4

OBJECTIVES:

To understand the Family as an Institution and various personal laws that govern issues relating to marriage, divorce, adoption and maintenance, minority and guardianship are the subject matter of this course. Student will go through Acts that govern and the decision of higher judiciary on various matter

MODULE I **8**

Application of various personal laws- Traditional and modern sources of Hindu Law and Muslim Law – The Classical Schools of Hindu Law and Muslim Law – Origin of the Schools – Main Schools and sub-Schools – Effect of Migration

MODULE II **LAW ON MARRIAGE**

Nature of Marriage – Various forms of marriage and requirements for a valid marriage on a comparative analysis – Void, voidable and valid marriage in different religious texts and statutes – Laws and Issues on marriage under the Special Marriage Act – Unisex marriage and question on living together – The demand of dowry and the concept of dower under the relevant personal laws – ceremonies of marriage under various religious systems.

MODULE III **LAW ON DIVORCE & MAINTENANCE**

Restitution of Conjugal Rights, Judicial Separation, Nullity of Marriage and

Divorce – Various grounds and procedure on a comparative analysis – Court's jurisdiction and procedure for the issues raised on marriage and divorce – In Camera proceedings – Decree on proceedings – Maintenance under Hindu, Muslim and Christian Laws – Permanent alimony – Maintenance during pendency of the suit - Maintenance under the Special Marriage Act, the Hindu Adoptions and Maintenance Act and the Code of Criminal Procedure. Structure, procedure and jurisdiction of Family Courts – The Family Courts Act

MODULE IV **LAW ON LEGITIMACY OF CHILDREN AND ADOPTION** **12**

Legitimacy of children born of void and voidable marriages – Their rights and legal issues – Adoption in different religious groups – Requisites, conditions, procedure of adoption – Effect of adoption – Inter-Country adoption

MODULE V **LAW ON MINORITY AND GUARDIANSHIP** **12**

Guardian under the Hindu Minority and Guardianship Act, 1956 – Definition- types of guardians – Guardianship under Muslim Law – Procedure for appointment and their powers – Guardian under the Guardian and Wards Act 1890

Total Hours – 60

TEXT BOOKS:

Books

Mulla - Hindu Law

N.R. Raghavachari - Hindu Law

Dr. Paras Diwan - Family Law

Mulla - Principles of Mahomedan Law

Fyzee - Outlines of Mahomedan Law

Kusum - Family Law Lectures – Family Law I

Mayne - Hindu Law & Usage

Mitra - Hindu Law

REFERENCES:

References:

Acts:

The Hindu Marriage Act, 1955

The Hindu Adoptions and Maintenance Act, 1956

The Hindu Minority and Guardianship Act, 1956

The Special Marriage Act, 1954

The Guardian and Wards Act, 1890

The Dissolution of Muslim Marriage Act, 1939

The Christian Marriage Act 1872

Indian Divorce Act, 1869

Indian Majority Act, 1875
The Muslim Women (Protection Of Rights On Divorce) Act, 1986
The Family Courts Act, 1984
The Dowry Prohibition Act, 1961
The Hindu Widows' Remarriage Act 1856
Prohibition of Child Marriage Act, 2006

OUTCOMES:

Student will get clarity on family as an institution and legal issues arise out of family relations. He can understand changing facets of family as a social unit and legal issues that surface.

COCY 102	HUMAN RIGHTS EDUCATION	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

Specific learning objective of the course as follows:

COB1: To understand foundation of human rights with the historical roots and multiple perspectives pertaining to it.
COB2: To discusses the history and development of International human rights laws and conventions.
COB3: To apprise the Indian Constitution in relation with human rights.
COB4: To familiarizes the students about Human rights violation of vulnerable and disadvantaged group in India and their issues.
COB5: To have an insight into the Human right Education.

MODULE I Concept of Human Rights **6**

Human rights – Meaning and Concept, Brief History of Human Rights- International and National Perspectives , Classification of human rights, Meaning and significance of Human Rights Education

MODULE II International Development of Human Rights **6**

United Nations and Universal Declaration of Human Rights (UDHR) 1948, Provision of the charters of United Nations, Covenant on civil and political rights, Covenant on Economic, Social and Cultural rights, UN mechanism and agencies

MODULE III Human Rights in the Indian Constitution **6**

Rights in Indian Constitution-their background, overview and contemporary debates, Relationship between Fundamental Rights and the International Covenant on Civil and Political Rights (ICCPR), Directive Principles of State Policy and International Covenant on Economic, Social and Cultural Rights (ICESCR)

MODULE IV Human rights of vulnerable and disadvantaged groups **6**

Meaning and Concept of Vulnerable and Disadvantaged, Social status of women and children in International and national perspective, Status of SC/ST and Other Indigenous People in the Indian Scenario, Human Rights of Aged and Disabled, The Minorities and Human Rights

MODULE V Promotion of Human Rights Education 6

Right to Education and Universalisation of Education, National Policy of Education and Human Rights, Constructing Child Centered Education, Human Rights Education – India and International, Human Rights Education: Problems and Prospects

L – 30; Total Hours – 30

TEXT BOOKS:

1. Ishay, M.,"The Human Rights Reader", United States of America, Routledge Taylor & Francis Group, 2007
2. Darren J. O'Byrne, "Human Rights An Introduction", Pearson Education, 2005
3. Nirmal, C.J., "Human Rights in India", OUP, New Delhi, 1999

REFERENCES:

1. Amartya, Sen. "The Idea of Justice", Penguin Books, 2009
2. Baxi, Upendra, "the Future of Human Rights",Oxford University Press, 2002
3. H. D, Agarwal, "International Law and Human Rights", Central Law Publications, 2008

COURSE OUTCOMES:

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

CO1: Gain knowledge in the historical origin of human rights
CO2: Overview of United Nation's contributions in protecting human rights
CO3: Familiarize with Indian Constitution and Human Rights
CO4: Sensitized to the Human rights violation of vulnerable and disadvantaged group in India
CO5: Synthesized the Human rights and Education

COCY 105	VALUE IN SOCIAL LIFE AND FAMILY	L	T	P	C
		2	0	0	2

COURSE OBJECTIVES:

Specific learning objective of the course as follows:

COB1: To imbibe deeper understanding on the need and importance for Value Based Living.

COB2: To articulate the need and importance of value based living.

COB3: To explain about role of family in society.

COB4: To provide an overview of various types of values in society.

COB5: To teach the significance of being responsible citizens of the society

MODULE I Value Education & Need 6

Concept of Values and Value Education-Historical Background of Value Education -Aims and Objectives of Value Education -Need, Importance and Role of Value Education in the present emerging Indian society - Classification of Values

MODULE II Life driven by values 6

Importance of value based living, Types of values, Personal values, Family values, Social values, Institutional values. Importance of goals, goal setting, SMART goals, SWOT analysis.

MODULE III Family and Social value 6

Family-Definition-Characteristics-Importance. Types of family-Functions of family-Role of men and women in family-Changes in family structure.

MODULE IV Types of Values & Profession 6

Constitutional or national values - Democracy, socialism, secularism, equality, justice, liberty, freedom and fraternity. Professional Values-Knowledge thirst, sincerity in profession, regularity, punctuality and faith. Religious Values - Tolerance, wisdom, character. Modernity vs. Value crisis, Issues and challenges

MODULE V Becoming a Responsible Citizen 6

Patriotism, Constitution and Fundamental rights, Good governance, Social movements, My Neighbors, Professional Ethics.

L – 30; Total Hours – 30

TEXT BOOKS:

1. Venkataiah.N, “Value Education”, APH Publishing Corporation, New Delhi,1998
2. Nagarazan. “A Text Book on Professional Ethics and Human Values”, New Age International limited Publishers, 2006

3. Jagdish Chand, “ValueEducation”, Shipra Publications, 2007

REFERENCES:

1. Vidya Bhushan and D.R. Sachdeva, “Fundamental of Sociology”, Pearson, Delhi, 2012.
2. Mani Jacob, “Resource Book for Value Education”, Institute of Value Education, 2002

COURSE OUTCOMES:

After the completion of the course, students will have the ability to:

CO1: Understand the need and importance for Value education.

CO2: Realize the value of human life.

CO3: Analyse importance of role of family in social life.

CO4: Explain the various types of values in social life.

CO5: Emerge as responsible citizen with clear conviction to be a role-model in the society.

Courses relevant to Environment

GED 1206	ENVIRONMENTAL SCIENCES	L	T	P	C
SDG: All		2	0	0	2

COURSE OBJECTIVES:

To make the student conversant with the

COB1: various natural resources, availability, utilisation and its current scenario.

COB2: diverse ecosystems and its function, importance of biodiversity, its values, threats and conservation.

COB3: types of pollutants and its impacts on the environment and the effects of natural disasters.

COB4: impacts of human population, human health, diseases and immunisation for a sustainable lifestyle.

MODULE I NATURAL RESOURCES 8

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems - (a) Land resources: Land degradation soil erosion and desertification - (b) Forest resources: Use and over-exploitation, deforestation (c) Water resources: Use and over-utilisation of surface and ground water, conflicts over water, dams: benefits and problems, effects on forest and tribal people - (d) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, mining (e) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture (f) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources.

MODULE II ECOSYSTEMS AND BIODIVERSITY 8

Concept of an ecosystem - Food chains, food webs, Energy flow in the ecosystem - ecological pyramids - Ecological succession - Characteristic features, structure and function of (a) Terrestrial Ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem (b) Aquatic fresh water ecosystems: Ponds and lakes, rivers and streams (c) Aquatic salt water ecosystems: oceans and estuaries

Biodiversity and its conservation - Types: genetic, species and ecosystem diversity - Values of biodiversity - India as a mega-diversity nation - Invasive, endangered, endemic and extinct species - Hot sports of biodiversity and Red Data book - Threats to biodiversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

MODULE III ENVIRONMENTAL POLLUTION AND DISASTER MANAGEMENT 8

Sources, cause, effects and control measures of: (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear pollution (h) ill-effects of fireworks and upkeep of clean environment, types of fire and fire extinguishers- Solid waste Management: types, collection, processing and disposal of urban waste, industrial waste, e-waste and biomedical wastes - Disaster management: flood, drought, cyclone, landslide, avalanche, volcanic eruptions, earthquake and tsunami.

MODULE IV HUMAN POPULATION, HEALTH AND SOCIAL ISSUES 6

Human Population - Population growth, Population explosion, population pyramid among nations - Family Welfare Programme - Human Rights - Value Education - Environment and human health: air-borne, water borne, infectious diseases, contagious diseases and immunisation (all types of vaccines from birth), risks due to chemicals in food and water, endocrine disrupting chemicals, cancer and environment - Sustainable development - Resettlement and rehabilitation of people - Environment Legislative laws- Women and Child Welfare, Public awareness.

Case studies related to current situation.

L – 30; Total Hours – 30

TEXT BOOKS:

1. Erach Bharucha, “Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education for University Grants Commission”, Orient Blackswan Pvt. Ltd., Hyderabad, India, 2013.
2. Benny Joseph, “Environmental Studies”, Tata McGraw-Hill Education, India, 2009.
3. Ravikrishnan A, “Environmental Science and Engineering”, Sri Krishna Publications, Tamil Nadu, India, 2018.
4. Raman Sivakumar, “Introduction to Environmental Science and Engineering”, McGraw Hill Education, India, 2009.
5. Venugopala Rao P, “Principles of Environmental Science and Engineering”, Prentice Hall India Learning Private Limited; India, 2006.
6. Anubha Kaushik and Kaushik C.P., “Environmental Science and Engineering”, New Age International Pvt. Ltd., New Delhi, India, 2009.

REFERENCES:

1. Masters G.M., “Introduction to Environmental Engineering and Science”, Prentice Hall,

New Delhi, 1997.
2. Henry J.G. and Heike G.W., “Environmental Science and Engineering”, Prentice Hall International Inc., New Jersy, 1996.
3. Miller T.G. Jr., “Environmental Science”, Wadsworth Publishing Co. Boston, USA, 2016.
4. “Waste to Resources: A Waste Management Handbook”, The Energy and Resources Institute, 2014.
5. https://www.teriin.org/article/e-waste-management-india-challenges-and-opportunities.
6. https://green.harvard.edu/tools-resources/how/6-ways-minimize-your-e-waste.
7. https://www.aiims.edu/en/departments-and-centers/central-facilities/265-biomedical/7346-bio-medical-waste-management.html.
8. https://tspcb.cgg.gov.in/Shared%20Documents/Guidelines%20for%20Management%20of%20Healthcare%20Waste%20Waste%20Management%20Rules,%202016%20by%20Health%20Care%20Facilities.pdf.

COURSE OUTCOMES:

The student will be able to

CO1: analyse the current scenario of various natural resources and their depletion and suggest remedies to curb the exploitation.

CO2: identify food chains and web and its function in the environment, assess the impacts on the biodiversity and propose solutions to conserve it.

CO3: analyse the types and impacts of pollutants in the environment and propose suitable methods to alleviate the pollutants and the natural disasters.

CO4: assess on the impact of human population and the health related issues and immunisation practices and sustainable developments for a healthy life.

Board of Studies (BoS) : 11th BoS of Chem held on 17.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	L	M	-	-	L	M	-	-	-	-	-	-	-
CO2	-	-	-	M	H	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	M	M	-	-	L	-	-	-
CO4	-	-	-	-	-	M	M	M	-	-	-	L	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Note: L- Low Correlation M - Medium Correlation H -High Correlation

SDG All: No Poverty, Zero Hunger, Good Health and Well-Being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable & Clean Energy, Decent Work and Economic Growth, Industry, Innovation & Infrastructure, Reduced Inequalities, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land, Peace, Justice and Strong Institutions, Partnerships for the Goals.

Statement: This course discuss about the environment, all the natural resources available, sharing of resources, effective utilisation, effects of over utilisation, health and environmental issues pertained to that, global warming and related issues, climates, disasters, impact assessments, population, human rights, societal welfare, laws to conserve the environment and sustainability.

LSDX 024	**ENVIRONMENTAL BIOTECHNOLOGY**	**L**	**T**	**P**	**C**
SDG: 6		**4**	**0**	**0**	**4**

COURSE OBJECTIVES:

COB1: To learn the environment protection Act and Law related to environmental biotechnology

COB2: To give basic idea on environmental sample analysis

COB3: To understand the basic principles involved in waste water management

COB4: To get the information on usage of Bioremediation-biotechnology

COB5: To inform students about Biooxidation & microbial leaching

MODULE I INTRODUCTION TO ENVIRONMENTAL BIOTECHNOLOGY 15h

Water, Soil and Air: their sources and effects. Removal of Specific Pollutants: Sources of Heavy Metal Pollution, Microbial Systems for Heavy Metal Accumulation, Biosorption & detoxification mechanisms. Environment protection Act: Environmental laws, Environmental policies, Environmental ethics.

MODULE II ENVIRONMENTAL SAMPLE ANALYSIS 10h

Physicochemical and bacteriological analysis of soil and water, Problems associated with soil alkali soils, sodic soils, and solid waste, Fate of insecticides fungicides, pesticides in soil, use of genetically modified (insect- , pest- and pathogen resistant) plants. Ecotoxicology of soil pollutants, Municipal solid waste treatment strategies.

MODULE III WASTE WATER MANAGEMENT 15h

Waste water constituents, Analysis and selection of flow rates and loadings, Process Selection, Physical unit operations, Chemical unit operations, Fundamentals of biological treatment, Role of biotechnology in water purification systems. Types and kinetics of biological treatment, Advanced waste water treatment, Biological Processes for Industrial and domestic effluent, Treatment, Aerobic Biological Treatment, Anaerobic Biological Treatment.

MODULE IV BIOREMEDIATION-BIOTECHNOLOGY 10h

Bioremediation-Biotechnology for clean environment, Biomaterials as substitutes for non-degradable materials, Metal microbe interactions: Heavy Metal Pollution and impact on environment, Microbial Systems for Heavy Metal Accumulation, Biosorption, molecular mechanisms of heavy metal tolerance Bioindicators and biosensors for detection of pollution. Biotechnology for Hazardous Waste Management, Persistent organic pollutants, Xenobiotics, Biological Detoxification of PAH, Biotechniques for Air Pollution Control. Solid Waste Management.

MODULE V BIOOXIDATION & MICROBIAL LEACHING 10h

Biooxidation – Direct and Indirect Mechanisms. Bacterial oxidation of Sphalerite, Chalcopyrite and Pyrite. Recovery of metals from solutions; Microbes in petroleum extraction; Microbial desulfurization of coal.

L – 60; TOTAL HOURS - 60

TEXT BOOKS:

1. Amann, R.I. Stromley, J. Stahl : Applied & Environmental Microbiology
2. Environmental Microbiology, W.D. Grant & P.E. Long, Blakie, Glassgow and London.

REFERENCES:

1.Biotreatment Systems, Vol. 22, D. L. Wise (Ed.), CRC Press, INC.
2.Standard Methods for the Examination of Water and Waste Water (14 th Education), 1985. American Public health Association

COURSE OUTCOMES:

CO1: The concepts, types and factors affecting natural processes

CO2: Of applications, specific advantages and disadvantages of specific bioremediation technologies, analysis of water samples, etc

CO3: Of molecular techniques in used in waste water management

CO4: Bioremediation of nuclear waste

CO5: Bioremediation of heavy metals and oil

Board of Studies (BoS) : 8th BoS of SLS held on 5.07.2021

Academic Council: 17th AC held on 15.07.2021

Courses relevant to Sustainability

		L	T	P	C
SSCXO4	ECONOMICS OF SUSTAINABLE DEVELOPMENT	2	0	0	2

OBJECTIVES:

- To have an increased awareness on the concept and components of sustainable development.
- To develop the ability to demonstrate the need of sustainable development and international responses to environmental challenges.
- To have an insight into global environmental issues and sustainable globalization.
- To establish a clear understanding of the policy instruments of sustainable development.

MODULE I CONCEPT OF SUSTAINABLE DEVELOPMENT 7

Evolution of the Concept – Rio Summit and sustainable development - various definitions of sustainable development - Components of sustainable development: Social, environmental and economic components.

MODULE II NEED FOR SUSTAINABLE DEVELOPMENT 8

Need for sustainability – Global environmental challenges: population growth, resource depletion, pollution, energy use, climate change, pollution, growing water scarcity, other urban problems, loss of biodiversity, hazardous wastes disposal.International responses to environmental challenges - Global policy such as Kyoto Protocol, Montreal Protocol, Basel Convention.

MODULE III GLOBALIZATION AND ENVIRONMENT SUSTAINABILITY 8

Impact of Globalization on sustainable development, Co - existence of globalization and Environment sustainability, Globalization and Global Governance.Green economy - Renewable energy, sustainable transport, sustainable construction, land and water management, waste management.

MODULE IV POLICIES FOR ACHIEVING SUSTAINABLE DEVELOPMENT **7**

Principles of environmental policy for achieving sustainable development: precautionary principle and polluter pays principle – Business Charter for Sustainable Development.Policy instruments for sustainable development: direct regulation – market based pollution control instruments such as pollution tax, subsidy, pollution permits.

L – 30; T – 0; Total Hours –30

TEXT BOOKS:

1. Anderson, David A (2010), "*Environmental Economics and Natural Resource Management*", Routledge, 3rd edition.
2. Karpagam M (1999), "*Environmental Economics: A Textbook*", Sterling Publishers Pvt. Ltd, New Delhi.

REFERENCES:

1. Karpagam M and Jaikumar Geetha (2010), "*Green Management Theory and Applications*", Ane Books Pvt. Ltd, New Delhi.
2. Sengupta Ramprasad (2004), "*Ecology and Economics: An Approach to Sustainable Development*", Oxford University Press, New Delhi.

OUTCOMES:

On successful completion of this course,

- The students will have understood the concepts and components of sustainable development.
- The students will have a holistic overview on the challenges of sustainable development and International responses to environmental challenges.
- The students will have gained knowledge on the global environment issues and demonstrate responsible globalization through global governance.
- The students will have developed awareness of the ethical, economic, social and political dimensions that influence sustainable development.

GECX201	GREEN DESIGN AND SUSTAINABILITY	L	T	P	C
		3	0	0	3

OBJECTIVES:

- To impart knowledge to face challenges, the technology poses for water, energy, and climate change by implementing sustainable design.

MODULE I CONCEPTS OF SUSTAINABLE DEVELOPMENT 7

Objectives of Sustainable Development - Need for sustainable development-Environment and development linkages - Globalisation and environment-Population, poverty and pollution- global, regional and local environment issues-Green house gases and climate change.

MODULE II SUSTAINABLE DEVELOPMENT OF SOCIO ECONOMIC SYSTEMS 8

Demographic dynamics of sustainability- Policies for socio economic development- Sustainable Development through trade- Economic growth- Action Plan for implementing sustainable development- Sustainable Energy and Agriculture.

MODULE III FRAME WORK FOR ACHIEVING SUSTAINBAILITY 7

Sustainability indicators- Hurdles to sustainability- Business and Industry – Science and Technology for Sustainable Development- Performance indicators of sustainability and assessment mechanism- Constraints and barriers of Sustainable Development.

MODULE IV GREEN BUILDINGS 8

Introduction to Green Building- Energy- Water- Materials and Resources - Sustainable Sites and Land Use - Indoor Environmental Quality- Life Cycle Assessment- Energy, water and materials efficiency.

MODULE V ENERGY CONSERVATION AND EFFICIENCY 7

Energy savings- Energy Audit- Requirements- Benefits of Energy conservation-Energy conservation measures for buildings- Energy wastage- impact to the environment.

MODULE VI GREEN BUILDINGS DESIGN 8

Elements of Green Buildings Design- Foundation, Electrical, Plumbing, flooring, Decking, roofing, insulation, wall coverings, windows, siding, doors and finishing, LEED certification for Green Buildings, Green Buildings for sustainability.

L – 45; Total Hours –45

TEXT BOOKS:

1. Kirby, J., Okeefe, P., and Timber lake, “Sustainable Development”, Earthscan Publication, London, 1995.

REFERENCES:

1. Charles Kibert, J., “Sustainable Construction: Green Building Design and Delivery”, 2nd Edition, John Wiley and sons, 2007.

OUTCOMES:

At the end of the course, the students will be able to

- Explain the relationship between sustainability and emergence of green building practices.
- Address the economic, environmental, and social concerns.