



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagamal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

**B.Tech. INFORMATION TECHNOLOGY  
REGULATIONS – 2021  
AUTONOMOUS SYLLABUS  
CHOICE BASED CREDIT SYSTEM  
III TO IV SEMESTER CURRICULUM AND SYLLABI**

**VISION:**

To make the department of Information Technology the unique of its kind in the field of Research and Development activities in this part of world

**MISSION:**

To impart highly innovative and technical knowledge in the field of Information Technology to the urban and unreachable rural student folks through Total Quality Education.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

- PEO 1:** Technical Knowledge : Graduates will be able to identify, analyze and create solutions for real life, industrial and societal needs by applying the principles and practices of Information Technology.
- PEO 2:** Teamwork & Ethics : Graduates will be able to collaborate effectively and ethically in a multi-disciplinary team as a member &/ as a leader.
- PEO 3:** Lifelong Learning : Graduates will be able to adopt the contemporary technologies in the field of Information Technology to provide solutions for challenging environments.

**PROGRAM OUTCOMES:**

After going through the four years of study, the B.Tech. Information Technology graduates will have the ability to

<b>POs</b>	<b>Graduate Attribute</b>	<b>Programme Outcome</b>
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

**PSO1 :** Demonstrate technical and interpersonal skills to design and develop IT enabled solutions to meet the real time industrial and societal needs

**PSO2 :** Exhibit an ability to adapt to the evolutionary changes in computing



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**REGULATIONS - 2021  
 CHOICE BASED CREDIT SYSTEM  
 B.TECH. INFORMATION TECHNOLOGY  
 CURRICULUM AND SYLLABI FOR SEMESTER III TO IV**

**SEMESTER III**

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1	MA2201	Linear Algebra and Boundary Value Problems	BS	4	3	1	0	4
2	IT2201	Computer Organization and Architecture	PC	3	3	0	0	3
3	IT2202	Object Oriented Programming	PC	3	3	0	0	3
4	IT2203	Software Engineering	PC	3	3	0	0	3
5	EC2203	Digital Systems	ES	3	3	0	0	3
6	EE2201	Fundamentals of Electrical and Electronics Engineering	ES	3	3	0	0	3
7	GE2201	Design Thinking	ES	3	3	0	0	3
8		Audit Course	AU	3	3	0	0	0
<b>PRACTICALS</b>								
9	IT2204	Object Oriented Programming Laboratory	PC	4	0	0	4	2
10	EC2204	Digital Systems Laboratory	ES	4	0	0	4	2
<b>TOTAL</b>				<b>33</b>	<b>24</b>	<b>1</b>	<b>8</b>	<b>26</b>

**SEMESTER IV**

<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATE GORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1	MA2251	Discrete Mathematics and Probability	BS	4	3	1	0	4
2	CS2251	Database Management Systems	PC	3	3	0	0	3
3	IT2251	Data Structures	PC	3	3	0	0	3
4	IT2252	Operating Systems <sup>#</sup>	PC	5	3	0	2	4
5	IT2253	Web Essentials	PC	3	3	0	0	3
6	GE2251	Quantitative Aptitude	EM	1	1	0	0	1
7	AUD110	Tamils and Technology	HS	0	3	0	0	0
<b>PRACTICALS</b>								
8	CS2254	Database Management Systems Laboratory	PC	4	0	0	4	2
9	IT2254	Data Structures Laboratory	PC	4	0	0	4	2
10	IT2255	Web Essentials Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>31</b>	<b>19</b>	<b>1</b>	<b>14</b>	<b>24</b>

<sup>#</sup> Theory cum Laboratory Course

AUD101	CONSTITUTION OF INDIA	L	T	P	C
		3	0	0	0
<b>OBJECTIVES:</b>					
This course enables the students to					
<ul style="list-style-type: none"> <li>• Teach history and functionality of Indian Constitution.</li> <li>• Describe the premises informing the twin themes of liberty and freedom from a civil rights perspective.</li> <li>• Summarize powers and functions of Indian government.</li> <li>• Explain structure and functions of local administration.</li> <li>• Develop an idea about the functionality of the Indian Constitution</li> </ul>					
<b>UNIT I</b>	<b>INTRODUCTION</b>				<b>9</b>
History of Making of the Indian Constitution-Drafting Committee- (Composition & Working) -Philosophy of the Indian Constitution-Preamble-Salient Features.					
<b>UNIT II</b>	<b>CONTOURS OF CONSTITUTIONAL RIGHTS &amp; DUTIES</b>				<b>9</b>
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.					
<b>UNIT III</b>	<b>ORGANS OF GOVERNANCE</b>				<b>9</b>
Parliament - Composition - Qualifications and Disqualifications-Powers and Functions- Executive President-Governor-Council of Ministers - Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions-Constitutional amendment provisions.					
<b>UNIT IV</b>	<b>LOCAL ADMINISTRATION</b>				<b>9</b>
District's Administration head- Role and Importance-Municipalities- Introduction- Mayor and role of Elected Representative-CEO of Municipal Corporation-Pachayati raj- Introduction- PRI- Zila Pachayat- 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 management.					
<b>UNIT V</b>	<b>FUNCTIONAL ASPECTS</b>				<b>9</b>
Right to information, Right to education, Interpretation of Govt policies, finance-related content, income tax, GST, etc. And their functionalities in students day to day life –Youth Parliament.					
<b>TOTAL: 45 PERIODS</b>					

<b>OUTCOMES:</b>	
After successful completion of the course, the students will be able to:	
<b>CO1</b>	Understand history and philosophy of Indian constitution.
<b>CO2</b>	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
<b>CO3</b>	Understand powers and functions of Indian government
<b>CO4</b>	Understand structure and functions of local administration.
<b>CO5</b>	Understand the functionality of the constitution.
<b>TEXT BOOKS:</b>	
1 Basu D. D., 2015. <i>Introduction to the Constitution of India</i> , Lexis Nexis.	
2 Busi S N, and Ambedkar B. R., 2015. <i>Framing of Indian Constitution</i> , 1st Edition.	
3 Jain M P., 2014. <i>Indian Constitution Law</i> , 7th Edn., Lexis Nexis.	
4 The Constitution of India (Bare Act), Government Publication, 1950.	

#### MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>									M			M
<b>CO2</b>									M			M
<b>CO3</b>									M			M
<b>CO4</b>									M			M
<b>CO5</b>									M			M

**H – High; M – Medium; L – Low**



Course Code	Course Name	L	T	P	C
GE2154	TAMILS AND TECHNOLOGY	1	0	0	1

**OBJECTIVES:**

This course enables the students to

- Understand the art of making things and developments in the lifestyle of people
- Understand the various methods of constructing buildings.
- Understand the techniques being used in Architecture by Tamils
- Understand and apply the concepts of Tamil with modern technology

**WEAVING AND CERAMIC TECHNOLOGY 3**

Weaving Industry during Sangam Age - Ceramic Technology - Black and Red Ware Potteries (BRW) - Graffiti on Potteries.

**DESIGN AND CONSTRUCTION TECHNOLOGY 3**

Designing and Structural construction House & Designs in household materials during Sangam Age - Building materials and Hero stones of Sangam age - Details of Stage Constructions in Silappathikaram - Sculptures and Temples of Mamallapuram - Great Temples of Cholas and other worship places - Temples of Nayaka Period - Type study (Madurai Meenakshi Temple) - Thirumalai Nayakar Mahal - Chetti Nadu Houses, Indo - Saracenic architecture at Madras during British Period.

**MANUFACTURING TECHNOLOGY 3**

Art of Ship Building - Metallurgical studies - Iron industry - Iron smelting, steel - Copper and gold - Coins as source of history - Minting of Coins - Beads making - industries Stone beads - Glass beads - Terracotta beads - Shell beads / bone beads - Archeological evidences - Gem stone types described in Silappathikaram.

**AGRICULTURE AND IRRIGATION TECHNOLOGY 3**

Dam, Tank, ponds, Sluice, Significance of Kumizhi Thoompu of Chola Period, Animal Husbandry - Wells designed for cattle use - Agriculture and Agro Processing - Knowledge of Sea - Fisheries - Pearl - Conche diving - Ancient Knowledge of Ocean - Knowledge Specific Society.

## SCIENTIFIC TAMIL & TAMIL COMPUTING

3

Development of Scientific Tamil - Tamil computing - Digitalization of Tamil Books -  
Development of Tamil Software - Tamil Virtual Academy - Tamil Digital Library -  
Online Tamil Dictionaries - Sorkuvai Project.

**Total : 15 Periods**

### OUTCOMES:

After successful completion of the course, the students will be able to:

CO1	Know the gradual improvement in the life history of Tamils.
CO2	Construct buildings with the impact of past with the present..
CO3	Learn to manufacture remarkable things with the help of technology
CO4	Apply the ancient skills to find out the measurements of oceans
CO5	Apply the concepts of Tamil with modern technology

### TEXT-CUM-REFERENCE BOOKS:

1. தமிழக வரலாறு - மக்களும் பண்பாடும் - கே.கே. பிள்ளை (வெளியீடு: தமிழ்நாடு பாடநூல் மற்றும் கல்வியியல் பணிகள் கழகம்).
2. கணினித் தமிழ் - முனைவர் இல. சுந்தரம். (விகடன் பிரசுரம்).
3. கீழடி - வைகை நதிக்கரையில் சங்ககால நகர நாகரிகம் (தொல்லியல் துறை வெளியீடு)
4. பொருதை - ஆற்றங்கரை நாகரிகம். (தொல்லியல் துறை வெளியீடு)
5. Social Life of Tamils (Dr.K.K.Pillay) A joint publication of TNTB & ESC and RMRL - (in print)
6. Social Life of the Tamils - The Classical Period (Dr.S.Singaravelu) (Published by: International Institute of Tamil Studies.
7. Historical Heritage of the Tamils (Dr.S.V.Subatamanian, Dr.K.D. Thirunavukkarasu) (Published by: International Institute of Tamil Studies).
8. The Contributions of the Tamils to Indian Culture (Dr.M.Valarmathi) (Published by: International Institute of Tamil Studies.)
9. Keeladi - 'Sangam City Civilization on the banks of river Vaigai' (Jointly Published by: Department of Archaeology & Tamil Nadu Text Book and Educational Services Corporation, Tamil Nadu)
10. Studies in the History of India with Special Reference to Tamil Nadu (Dr.K.K.Pillay) (Publishedby: The Author)
11. Porunai Civilization (Jointly Published by: Department of Archaeology & Tamil Nadu Text Bookand Educational Services Corporation, Tamil Nadu)
12. Journey of Civilization Indus to Vaigai (R.Balakrishnan) (Published by: RMRL) - Reference Book.

**ANNA UNIVERSITY, CHENNAI  
AFFILIATED INSTITUTIONS  
B.TECH INFORMATION TECHNOLOGY  
REGULATIONS – 2017  
CHOICE BASED CREDIT SYSTEM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs)**

1. To ensure graduates will be proficient in utilizing the fundamental knowledge of basic sciences, mathematics and Information Technology for the applications relevant to various streams of Engineering and Technology.
2. To enrich graduates with the core competencies necessary for applying knowledge of computers and telecommunications equipment to store, retrieve, transmit, manipulate and analyze data in the context of business enterprise.
3. To enable graduates to think logically, pursue lifelong learning and will have the capacity to understand technical issues related to computing systems and to design optimal solutions.
4. To enable graduates to develop hardware and software systems by understanding the importance of social, business and environmental needs in the human context.
5. To enable graduates to gain employment in organizations and establish themselves as professionals by applying their technical skills to solve real world problems and meet the diversified needs of industry, academia and research.

**PROGRAM OUTCOMES (POs)**

**ENGINEERING GRADUATES WILL BE ABLE TO:**

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

#### **PROGRAM SPECIFIC OBJECTIVES (PSOs)**

1. To create, select, and apply appropriate techniques, resources, modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
2. To manage complex IT projects with consideration of the human, financial, ethical and environmental factors and an understanding of risk management processes, and operational and policy implications.

**SEMESTER VII**

SI.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	MG8591	Principles of Management	HS	3	3	0	0	3
2.	CS8792	Cryptography and Network Security	PC	3	3	0	0	3
3.	CS8791	Cloud Computing	PC	3	3	0	0	3
4.		Open Elective II	OE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Professional Elective III	PE	3	3	0	0	3
<b>PRACTICALS</b>								
7.	IT8711	FOSS and Cloud Computing Laboratory	PC	4	0	0	4	2
8.	IT8761	Security Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>26</b>	<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

**SEMESTER VIII**

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
<b>PRACTICALS</b>								
3.	IT8811	Project Work	EEC	20	0	0	20	10
<b>TOTAL</b>				<b>26</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>16</b>

**TOTAL NO. OF CREDITS: 185**

**SEMESTER VII  
ELECTIVE - II**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	IT8002	Web Development Frameworks	PE	3	3	0	0	3
2.	CS8082	Machine Learning Techniques	PE	3	3	0	0	3
3.	IT8003	Formal Languages and Automata Theory	PE	3	3	0	0	3
4.	CS8081	Internet of Things	PE	3	3	0	0	3
5.	IT8075	Software Project Management	PE	3	3	0	0	3
6.	IT8074	Service Oriented Architecture	PE	3	3	0	0	3
7.	GE8077	Total Quality Management	PE	3	3	0	0	3

**SEMESTER VII  
ELECTIVE - III**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8079	Human Computer Interaction	PE	3	3	0	0	3
2.	CS8073	C# and .Net Programming	PE	3	3	0	0	3
3.	CS8088	Wireless Adhoc and Sensor Networks	PE	3	3	0	0	3
4.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3
5.	CS8071	Advanced Topics on Databases	PE	3	3	0	0	3
6.	GE8074	Human Rights	PE	3	3	0	0	3
7.	GE8071	Disaster Management	PE	3	3	0	0	3

**SEMESTER VIII  
ELECTIVE - IV**

Sl. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8085	Social Network Analysis	PE	3	3	0	0	3
2.	CS8086	Soft Computing	PE	3	3	0	0	3
3.	CS8074	Cyber Forensics	PE	3	3	0	0	3
4.	IT8073	Information Security	PE	3	3	0	0	3
5.	EC8093	Digital Image Processing	PE	3	3	0	0	3
6.	IT8004	Network Management	PE	3	3	0	0	3
7.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3

**SEMESTER VIII  
ELECTIVE - V**

Sl.No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	CS8080	Information Retrieval Techniques	PE	3	3	0	0	3
2.	CS8078	Green Computing	PE	3	3	0	0	3
3.	CS8084	Natural Language Processing	PE	3	3	0	0	3
4.	IT8077	Speech Processing	PE	3	3	0	0	3
5.	IT8078	Web Design and Management	PE	3	3	0	0	3
6.	IT8005	Electronic Commerce	PE	3	3	0	0	3
7.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

**\*Professional Electives are grouped according to elective number as was done previously.**

**OBJECTIVE:**

- To enable the students to create an awareness on Engineering Ethics and Human Values, to instill Moral and Social Values and Loyalty and to appreciate the rights of others.

**UNIT I HUMAN VALUES****10**

Morals, values and Ethics – Integrity – Work ethic – Service learning – Civic virtue – Respect for others – Living peacefully – Caring – Sharing – Honesty – Courage – Valuing time – Cooperation – Commitment – Empathy – Self confidence – Character – Spirituality – Introduction to Yoga and meditation for professional excellence and stress management.

**UNIT II ENGINEERING ETHICS****9**

Senses of 'Engineering Ethics' – Variety of moral issues – Types of inquiry – Moral dilemmas – Moral Autonomy – Kohlberg's theory – Gilligan's theory – Consensus and Controversy – Models of professional roles - Theories about right action – Self-interest – Customs and Religion – Uses of Ethical Theories.

**UNIT III ENGINEERING AS SOCIAL EXPERIMENTATION****9**

Engineering as Experimentation – Engineers as responsible Experimenters – Codes of Ethics – A Balanced Outlook on Law.

**UNIT IV SAFETY, RESPONSIBILITIES AND RIGHTS****9**

Safety and Risk – Assessment of Safety and Risk – Risk Benefit Analysis and Reducing Risk - Respect for Authority – Collective Bargaining – Confidentiality – Conflicts of Interest – Occupational Crime – Professional Rights – Employee Rights – Intellectual Property Rights (IPR) – Discrimination.

**UNIT V GLOBAL ISSUES****8**

Multinational Corporations – Environmental Ethics – Computer Ethics – Weapons Development – Engineers as Managers – Consulting Engineers – Engineers as Expert Witnesses and Advisors – Moral Leadership – Code of Conduct – Corporate Social Responsibility.

**TOTAL: 45 PERIODS****OUTCOMES:**

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

**TEXT BOOKS:**

1. Mike W. Martin and Roland Schinzinger, "Ethics in Engineering", Tata McGraw Hill, New Delhi, 2003.
2. Govindarajan M, Natarajan S, Senthil Kumar V. S, "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.

**REFERENCES:**

1. Charles B. Fleddermann, "Engineering Ethics", Pearson Prentice Hall, New Jersey, 2004.
2. Charles E. Harris, Michael S. Pritchard and Michael J. Rabins, "Engineering Ethics – Concepts and Cases", Cengage Learning, 2009.
3. John R Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003
4. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.
5. Laura P. Hartman and Joe Desjardins, "Business Ethics: Decision Making for Personal Integrity and Social Responsibility" Mc Graw Hill education, India Pvt. Ltd., New Delhi, 2013.
6. World Community Service Centre, ' Value Education', Vethathiri publications, Erode, 2011.



**Web sources:**

1. [www.onlineethics.org](http://www.onlineethics.org)
2. [www.nspe.org](http://www.nspe.org)
3. [www.gloalethics.org](http://www.gloalethics.org)
4. [www.ethics.org](http://www.ethics.org)

**IT8811****PROJECT WORK****L T P C  
0 0 20 10****OBJECTIVES:**

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same. To train the students in preparing project reports and to face reviews and viva voce examination.

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepares a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The review committee may be constituted by the Head of the Department. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the Head of the Department.

**TOTAL: 300 PERIODS****OUTCOME:**

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.



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**B.E. ELECTRONICS AND COMMUNICATION ENGINEERING  
REGULATION – 2020  
AUTONOMOUS SYLLABUS  
CHOICE BASED CREDIT SYSTEM  
V TO VI SEMESTER CURRICULUM AND SYLLABI**

**VISION:**

To make the Department of Electronics and Communication Engineering of this Institution the unique of its kind in the field of Research and Development activities in this part of world.

**MISSION:**

To impart highly innovative and technical knowledge in the field of Electronics and Communication Engineering to the urban and unreachable rural student folks through Total Quality Education.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

- PEO 1:** To establish a strong foundation in Electronics and Communication Engineering necessary to formulate, model, analyze and solve real time problems.
- PEO 2:** To inculcate professional skills and life skills for placement or to pursue higher studies in the relevant fields.
- PEO 3:** To promote research and development activities and solve industrial problems with creative ideas.

**PROGRAM OUTCOMES:**

After going through the four years of study, the Electronics and Communication Engineering graduates will have the ability to

<b>POs</b>	<b>Graduate Attribute</b>	<b>Programme Outcome</b>
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/Development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

**PSO1 :** Ability to make use of attained technical knowledge in the field of Electronics and Communication Engineering for successful career and qualifying in competitive examinations at the national level.

**PSO2 :** Ability to develop workable solutions for real time challenges in Electronics and Communication Engineering

### SEMESTER V

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1	EC1501	Communication Networks <sup>#</sup>	PC	5	3	0	2	4
2	EC1502	Digital Communication	PC	3	3	0	0	3
3	EC1503	Electronic Circuits - II	PC	3	3	0	0	3
4	EC1504	Transmission Lines and RF Systems	PC	3	3	0	0	3
5		Professional Elective - I	PE	3	3	0	0	3
6		Open Elective – I*	OE	3	3	0	0	3
<b>PRACTICALS</b>								
7	EC1511	Circuits Design and Simulation Laboratory	PC	4	0	0	4	2
8	EC1512	Communication Systems Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>31</b>	<b>21</b>	<b>0</b>	<b>10</b>	<b>23</b>

**OPEN ELECTIVE I (SEMESTER V)**

<b>S.NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATE GORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
1	OEC151	Basics of Signals and Systems	PE	3	3	0	0	3
2	OEC152	Digital Audio Engineering	PE	3	3	0	0	3
3	OEC153	Electronics Packaging	PE	3	3	0	0	3
4	OEC154	Space Time Wireless Communication	PE	3	3	0	0	3
5	OEC155	Telecommunication Network Management	PE	3	3	0	0	3
6	OEC156	Wavelets and its Applications	PE	3	3	0	0	3

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To understand the concept of Telecommunication network management standards.
- To design the common management information service element model.
- To understand the various concept of information modelling.
- To analyze the concept of SNMPv1 and SNMPv2 protocol.
- To analyze the concept of examples of network management.

**UNIT I FOUNDATIONS 9**

Telecommunication Network management standards–network management model–organization model – information model abstract syntax notation 1 (ASN.1) – encoding structure – functional model. Network management application functional requirements: Configuration management – fault management – performance management – Error correlation technology – security management – accounting management – common management – report management – polity based management – service level management – management service – community definitions – capturing the requirements – simple and formal approaches – semi formal and formal notations.

**UNIT II COMMON MANAGEMENT INFORMATION SERVICE ELEMENT 9**

CMISE model – service definitions – errors – scoping and filtering features – synchronization – functional units – association services – common management information protocol specification.

**UNIT III INFORMATION MODELING FOR TMN 9**

Rationale for information modeling – management information model – object oriented modeling paradigm – structure of management information – managed object class definition – management information base.

**UNIT IV SIMPLE NETWORK MANAGEMENT PROTOCOL 9**

SNMPv1: managed networks – SNMP models – organization model – information model – SNMPv2 communication model – functional model – major changes in



SNMPv2 – structure of management information, MIB – SNMPv2 protocol – compatibility with SNMPv1 – SNMPv3 – architecture – applications – MIB security, remote monitoring – MIB – RMON1 and RMON2.

**UNIT V NETWORK MANAGEMENT EXAMPLES 9**

ATM integrated local management interface – ATM MIB –M1– M2– M3 – M4 – interfaces – ATM digital exchange interface management – digital subscriber loop and asymmetric DSL technologies – ADSL configuration management – performance management Telecommunication Network management tools: Network statistics management – management system – management platform case studies: OPENVIEW – ALMAP.

**TOTAL: 45 PERIODS**

**OUTCOMES**

- CO1:** Explain the concepts of Telecommunication network management standards.
- CO2:** Elucidate the service element for common management information.
- CO3:** Describe the various concept of information modelling.
- CO4:** Elaborate the concepts of simple network management protocol.
- CO5:** Interpret the various types of network management tools.

**TEXT BOOKS**

1. Subramanian, M, 2010. *Network management: principles and practice*. Pearson Education India.
2. Raman, L.G, 1999. *Fundamentals of telecommunications network management* (Vol. 3). Wiley-IEEE Press.

**REFERENCE BOOKS**

1. Henry Haojin Wang, 1999. *Telecommunication Network Management*, McGraw Hill.
2. Salah Aidarous & Thomas Plevyak, 1997. *Telecommunication Network Management: Technologies and Implementations*. Wiley IEEE Press.



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## **Department of Electrical and Electronics Engineering**

### **B.E. Electrical and Electronics Engineering**

**(Regulations 2020 – Autonomous)**

#### **Vision of the Department:**

To make the Department of Electrical and Electronics Engineering of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

#### **Mission of the Department:**

Department of Electrical and Electronics Engineering is committed to

1. Inculcate technical knowledge by providing well-balanced curriculum to the urban and unreachable rural student community through “Total Quality Education”
2. Induce leadership and entrepreneurial skills with high standard of ethics and moral values to the student community.
3. Impart innovative skills to the student community by effectively involving them in research activities.
4. Create a wholesome environment to promote effective interaction of students with the industry experts

#### **Program Educational Objectives (PEOs):**

Graduates of the programme will be able to

##### **1. Technical Knowledge:**

Apply Technical knowledge acquired in the field of Electrical and Electronics Engineering and allied areas for practical or industrial problems for a successful professional career

##### **2. Problem Solving:**

Develop and envisage appropriate solutions for real time technological problems faced by the industries and society.

5. Albert Thumann and Paul Mehta, 2013. *Handbook of Energy Engineering*, 7<sup>th</sup> Edition, River Publishers.

<b>OEE154</b>	<b>RENEWABLE ENERGY SOURCES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To know the significance of renewable energy resources.
- To get exposure on various renewable energy sources and its environmental impact.
- To learn about the solar, wind and biomass energy and its economic aspects.
- To know the various types and its function of geothermal energy ocean energy & fuel cell.

**UNIT I INTRODUCTION TO RENEWABLE ENERGY SOURCES 9**

Classification of Energy Sources- Importance of Non-Conventional Energy Sources- Energy Chain- Common Forms of Energy - Advantages and Disadvantages of Conventional Energy Sources - Salient Features of Non-Conventional Energy Sources - Environmental Aspects of Energy – Introduction to Energy Conservation - important aspects of energy conservation - Energy Storage: Necessity of Energy Storage, Energy Storage Devices and Energy Storage Methods.

**UNIT II SOLAR PV AND THERMAL ENERGY 9**

Solar Thermal Energy: Solar radiation, flat plate collectors and their materials, applications and performance - solar thermal power plants - Thermal energy storage for solar heating and cooling - limitations. Solar PV Cells: Theory of solar PV cells. Solar PV cell materials, solar PV array, solar PV power plant, limitations of solar PV. Types of PV power plants ( Stand alone & Grid connected)

**UNIT III FUEL CELLS AND WIND ENERGY 9**

Fuel Cells: Principle of working of various types of fuel cells, performance and limitations. Wind power and its sources, site selection, Types of WECS, Based on turbine VAT Turbine, HAT Turbine, Based on Power Delivery: Stand alone & Grid connected. Performance and limitations of energy conversion systems.

**UNIT IV GEOTHERMAL ENERGY & HYDRO POWER PLANT 9**

Geothermal Energy: Sources of geothermal energy, geothermal Power plant, environmental considerations. Essential components of Hydroelectric Systems, Classification of Hydro power schemes, Turbine theory, classification of water turbine.

**UNIT V BIO-MASS AND OCEAN ENERGY 9**

Bio-mass: Availability of bio-mass and its conversion theory. Ocean Thermal Energy Conversion (OTEC): Availability, theory and working principle, performance and limitations. Wave and Tidal Energy: Principle of working, performance and limitations.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

Upon Successful Completion of this course, the students will be able to

CO1: Describe the significance of various renewable energy resources and Energy storage technology.

CO2: Discuss on materials, types and applications of solar PV and Thermal energy storage system.

CO3: Describe the principle of working & types of fuel cells & WECS.

CO4: Discuss on geothermal energy and hydro power plant.

CO5: Illustrate the utilization of other energy sources such as biogas and Ocean energy.

**TEXT BOOKS:**

1. Khan, B.H., 2006. *Non-conventional energy resources*. Tata McGraw-Hill Education.

**REFERENCES:**

1. Rai, G.D., 2011. A Text book of Non-conventional energy Sources.
2. Twidell, J. and Weir, T., 2015. *Renewable energy resources*. Routledge.

<b>OEE155</b>	<b>SOFT COMPUTING TECHNIQUES AND APPLICATIONS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand the basics of soft computing techniques
- To describe the artificial neural network and its applications
- To explain the basics of fuzzy logic and its applications.
- To solve single objective optimisation problems using GAs.
- To analyse the features of hybrid control schemes.

**UNIT I INTRODUCTION TO SOFT COMPUTING 9**

Concept of computing systems – Soft computing vs Hard computing – Characteristics of soft computing – Some applications of soft computing techniques.

**UNIT II ARTIFICIAL NEURAL NETWORK 9**

Review of fundamentals – Biological neuron, artificial neuron, activation function, single layer perceptron – Limitation – Multi layer perceptron – Back Propagation Algorithm (BPA) – Recurrent Neural Network (RNN) – Adaptive Resonance Theory (ART) based network – Radial basis function network – online learning algorithms, BP through time – Real Time Recurrent Learning algorithms – Reinforcement learning - Neural Network based controller.

**UNIT III FUZZY LOGIC 9**

Fuzzy set theory – Fuzzy sets – Operation on fuzzy sets – Fuzzy membership functions - Defuzzification – Fuzzy logic controller – Familiarization with fuzzy logic toolbox – Fuzzy logic application – A typical case study.

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**AFFILIATED INSTITUTIONS**  
**REGULATIONS 2017**  
**B. TECH. BIOTECHNOLOGY**  
**CHOICE BASED CREDIT SYSTEM**  
**I TO VIII SEMESTERS (FULL TIME) CURRICULA AND SYLLABI**

**SEMESTER I**

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1	HS8151	Communicative English	HS	4	4	0	0	4
2	MA8151	Engineering Mathematics – I	BS	4	4	0	0	4
3	PH8151	Engineering Physics	BS	3	3	0	0	3
4	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6	GE8152	Engineering Graphics	ES	6	2	0	4	4
<b>PRACTICALS</b>								
7	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
<b>TOTAL</b>				<b>31</b>	<b>19</b>	<b>0</b>	<b>12</b>	<b>25</b>

**SEMESTER II**

S. No.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1	HS8251	Technical English	HS	4	4	0	0	4
2	MA8251	Engineering Mathematics – II	BS	4	4	0	0	4
3	PH8254	Physics of Materials	BS	3	3	0	0	3
4	BE8252	Basic Civil and Mechanical Engineering	ES	4	4	0	0	4
5	BT8291	Microbiology	BS	3	3	0	0	3
6	BT8251	Biochemistry	PC	3	3	0	0	3
<b>PRACTICALS</b>								
7	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8	BT8261	Biochemistry Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>29</b>	<b>21</b>	<b>0</b>	<b>8</b>	<b>25</b>

5. Transformation & Selection of recombinants – Blue white screening assay
6. Optimisation of time of inducer for recombinant protein expression
7. Expression of protein profiling by SDS - PAGE
8. Western blotting, Southern blotting
9. PCR amplification of genes
10. Colony lysate PCR.

**TOTAL: 60 PERIODS**

**OUTCOMES:**

By the end of this course, students should be able to:

- Describe the main principles, methods for preparation and cloning of DNA in various organisms.
- Express clearly about the gene amplification and methods for analysis of DNA, such as hybridization, restriction analysis and gene expressions.
- Use genetic and biotechnological techniques to manipulate genetic materials and develop new and improved living organisms.
- Students will be aware of the hazardous chemicals and safety precautions in case of emergency.

**Equipment Needed for 30 Students**

Electrophoresis Kit	1
PCR	1
Incubators	2
Light Microscopes	4
Incubator Shaker	1
Spectrophotometer	2
Laminar Flow Chamber	2
Glassware, Chemicals, Media as required	

**REFERENCES:**

1. Old RW, Primrose SB, "Principles Of Gene Manipulation, An Introduction To Genetic Engineering", Blackwell Science Publications, 1993.
2. Anselmi FM, Brent R, Kingston RE, Moore DD, "Current Protocols In Molecular Biology", Greene Publishing Associates, NY, 1988.
3. Berger SI, Kimmer AR, "Methods In Enzymology", Vol 152, Academic Press, 1987

**GE8077**

**TOTAL QUALITY MANAGEMENT**

**L T P C**  
**3 0 0 3**

**OBJECTIVE:**

- To facilitate the understanding of Quality Management principles and process.

**UNIT I INTRODUCTION**

**9**

Introduction - Need for quality - Evolution of quality - Definitions of quality - Dimensions of product and service quality - Basic concepts of TQM - TQM Framework - Contributions of Deming, Juran and Crosby - Barriers to TQM - Customer focus - Customer orientation, Customer satisfaction, Customer complaints, Customer retention.

**UNIT II TQM PRINCIPLES 9**

Leadership - Quality Statements, Strategic quality planning, Quality Councils - Employee involvement - Motivation, Empowerment, Team and Teamwork, Recognition and Reward, Performance appraisal - Continuous process improvement - PDCA cycle, 5S, Kaizen - Supplier partnership - Partnering, Supplier selection, Supplier Rating.

**UNIT III TQM TOOLS AND TECHNIQUES I 9**

The seven traditional tools of quality - New management tools - Six sigma: Concepts, Methodology, applications to manufacturing, service sector including IT - Bench marking - Reason to bench mark, Bench marking process - FMEA - Stages, Types.

**UNIT IV TQM TOOLS AND TECHNIQUES II 9**

Quality Circles - Cost of Quality - Quality Function Deployment (QFD) - Taguchi quality loss function - TPM - Concepts, improvement needs - Performance measures.

**UNIT V QUALITY MANAGEMENT SYSTEM 9**

Introduction—Benefits of ISO Registration—ISO 9000 Series of Standards—Sector-Specific Standards—AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements—Implementation—Documentation—Internal Audits—Registration--**ENVIRONMENTAL MANAGEMENT SYSTEM:** Introduction—ISO 14000 Series Standards—Concepts of ISO 14001—Requirements of ISO 14001—Benefits of EMS.

**TOTAL: 45 PERIODS**

**OUTCOME:**

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

**TEXT BOOK:**

1. Dale H.Besterfield, Carol B.Michna,Glen H. Besterfield,Mary B.Sacre,Hemant Urdhwareshe and Rashmi Urdhwareshe, "Total Quality Management", Pearson Education Asia, Revised Third Edition, Indian Reprint, Sixth Impression, 2013.

**REFERENCES:**

1. James R. Evans and William M. Lindsay, "The Management and Control of Quality", 8<sup>th</sup> Edition, First Indian Edition, Cengage Learning, 2012.
2. Janakiraman. B and Gopal .R.K., "Total Quality Management - Text and Cases", Prentice Hall (India) Pvt. Ltd., 2006.
3. Suganthi.L and Anand Samuel, "Total Quality Management", Prentice Hall (India) Pvt. Ltd., 2006.
4. ISO9001-2015 standards

**BT8751**

**DOWNSTREAM PROCESSING**

**L T P C**

**3 0 0 3**

**OBJECTIVES:**

To enable the students to

- Understand the methods to obtain pure proteins, enzymes and in general about product development R & D



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**B.E. CIVIL ENGINEERING  
REGULATION – 2020  
AUTONOMOUS SYLLABUS  
CHOICE BASED CREDIT SYSTEM  
VII TO VIII SEMESTER CURRICULUM AND SYLLABI**

**VISION:**

To make the Department of Civil Engineering of this Institution the unique of its kind in the field of Research and Development activities in this part of world.

**MISSION:**

To impart highly innovative and technical knowledge in the field of Civil Engineering to the urban and unreachable rural student folks through Total Quality Education.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

- PEO 1:** Graduates of the program will be creative, able to apply scientific knowledge and computer aided design tools for technical problems in the field of Civil Engineering.
- PEO 2:** Graduates of the program will be a professional Civil Engineer and/or will pursue higher education in various domains of Civil Engineering by taking competitive examinations.
- PEO 3:** Graduates of the program will passionately perform as a competent team member, team leader and/or entrepreneur in the development of a sustainable environment.



OCE172

**ENVIRONMENTAL AND SOCIAL IMPACT  
ASSESSMENT**

L	T	P	C
3	0	0	3

**OBJECTIVES:**

- To impart the knowledge and skills to identify, assess and mitigate the environmental and social impacts of developmental projects

**UNIT I INTRODUCTION 9**

Impacts of Development on Environment – Rio Principles of Sustainable Development- Environmental Impact Assessment (EIA) – Objectives – Historical development – EIA Types – EIA in project cycle – EIA Notification and Legal Framework.

**UNIT II ENVIRONMENTAL ASSESSMENT 9**

Screening and Scoping in EIA – Drafting of Terms of Reference, Baseline monitoring, Prediction and Assessment of Impact on land, water, air, noise, flora and fauna - Matrices – Networks – Checklist Methods - Mathematical models for Impact prediction.

**UNIT III ENVIRONMENTAL MANAGEMENT PLAN 9**

Plan for mitigation of adverse impact on water, air and land, water, energy, flora and fauna – Environmental Monitoring Plan – EIA Report Preparation – Public Hearing-Environmental Clearance.

**UNIT IV SOCIO ECONOMIC ASSESSMENT 9**

Baseline monitoring of Socio economic environment – Identification of Project Affected Personal – Rehabilitation and Resettlement Plan- Economic valuation of Environmental impacts – Cost benefit Analysis.

**UNIT V CASE STUDIES 9**

EIA case studies pertaining to Infrastructure Projects – Roads and Bridges – Mass Rapid Transport Systems - Airports - Dams and Irrigation projects - Power plants.

**TOTAL: 45 PERIODS**

**OUTCOMES**

- CO1:** Carry out scoping and screening of developmental projects for environmental and social assessments
- CO2:** Explain different methodologies for environmental impact prediction and assessment
- CO3:** Plan environmental impact assessments and create environmental

management plans.

**CO4:** Evaluate environmental impact assessment reports.

**CO5:** Apply all the concepts in real time case study.

#### **TEXT BOOKS**

1. Canter, R.L., 1995, *Environmental impact Assessment*, 2nd Edition, McGraw Hill Inc, New Delhi
2. Lohani, B., J.W. Evans, H. Ludwig, R.R. Everitt, Richard A. Carpenter, and S.L. Tu., 1997, *Environmental Impact Assessment for Developing Countries in Asia*, Volume 1 – Overview, Asian Development Bank.
3. Peter Morris, RikiTherivel., 2009, *Methods of Environmental Impact Assessment*, Routledge Publishers.

#### **REFERENCE BOOKS**

1. Becker H. A., Frank Vanclay., 2003, *The International handbook of social impact assessment conceptual and methodological advances*, Edward Elgar Publishing.
2. Barry Sadler and Mary McCabe., 2002, *Environmental Impact Assessment Training Resource Manual*, United Nations Environment Programme.
3. Judith Petts., 1998, *Handbook of Environmental Impact Assessment Vol. I and II* Blackwell Science New York.
4. Guidelines of Government of India., 2018, *Ministry of Environment and Forests EIA Notification and Sectoral Guides*, New Delhi.



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**B.TECH. BIOTECHNOLOGY**  
**Regulation - 2020**  
**AUTONOMOUS SYLLABUS**  
**CHOICE BASED CREDIT SYSTEM (CBCS)**  
**(V and VI)**

**SEMESTER V**

SI. No.	COURSE CODE	COURSE TITLE	CATEGORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P		
<b>THEORY</b>								
1	BT1501	Bioprocess Principles	PC	3	0	0	3	3
2	BT1502	Genetic Engineering	PC	3	0	0	3	3
3	BT1503	Mass Transfer Operation	PC	3	0	0	3	3
4		Professional Elective I	PE	3	0	0	3	3
5		Professional Elective II	PE	3	0	0	3	3
6		Open Elective – I	OE	3	0	0	3	3
<b>PRACTICALS</b>								
7	BT1511	Bioprocess Laboratory I	PC	0	0	4	4	2
8	BT1512	Molecular Biology and Genetic Engineering Laboratory	PC	0	0	4	4	2
9	HS1521	Professional Communication	EEC	0	0	2	2	1
<b>TOTAL</b>				<b>18</b>	<b>0</b>	<b>10</b>	<b>28</b>	<b>23</b>

## MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

Course Outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	M	L	M	-	L	M	-	L	-	-	-	M	H	-	H
CO2	H	L	H	L	M	-	L	L	-	-	L	H	H	-	H
CO3	H	L	H	L	M	-	L	L	-	-	L	H	H	-	H
CO4	M	L	L	-	M	L	-	M	-	-	-	H	H	-	H
CO5	M	L	L	-	M	L	-	H	-	-	-	H	H	-	H

H – High; M – Medium; L – Low

BT1636

### INDUSTRIAL WASTE MANAGEMENT

L	T	P	C
3	0	0	3

#### OBJECTIVES:

This course enables the students to,

- Understand scientific and engineering principles to treat and minimize the industrial environmental problems.
- Emphasize the alternatives to the conventional treatment methods with modern engineering approaches to evade the environmental issues.

#### UNIT I INTRODUCTION

9

Industrial scenario in India - Types of industries - Industrial activity and Environment; Uses of Water in industrial processes; Industrial pollution: Types, Characteristics and environmental impacts of industrial wastes – Solid and Liquid; Toxicity of industrial wastes and Bioassay tests; Regulatory requirements for treatment of industrial wastes on water and land ecosystem.

## **UNIT II SOLID WASTE AND ITS DISPOSAL STRATEGIES 9**

Need for solid waste management; Elements of integrated waste management and roles of stakeholders; Waste disposal through landfills - Landfill Classification, types and methods - site selection - design and operation of sanitary landfills - landfill gas management - environmental monitoring - closure of landfills - landfill remediation.

## **UNIT III AEROBIC & ANAEROBIC TREATMENT OF WASTEWATER 9**

Aerobic treatment: Design of sewage treatment plant units - Activated Sludge process and variations - Membrane Biological Reactors - Trickling Filters - Moving Bed Reactors. Anaerobic treatment: Different stages of anaerobic digestion - Design of units – UASB, up flow filters, septic tank and disposal - Attached and suspended growth.

## **UNIT IV ADVANCED WATER TREATMENT TECHNOLOGIES 9**

Overview of Advanced Waste Water Treatment: Introduction, need and purpose of advanced waste water treatment; Advanced Oxidation Processes - Electrochemical Wastewater Treatment Processes – Electrochemical Oxidation – Ozonolytic oxidation – Modified Fenton Process – Photo driven Process; Redox Process – High energy Oxidation – Gamma and High electron beam.

## **UNIT V CLEANER PRODUCTION 9**

Waste management Approach; Waste Audit – Volume and strength reduction; Material and process modifications – Recycle, reuse and byproduct recovery – Applications; Environmental Forensics as integral part of governing systems.

**TOTAL: 45 PERIODS**

## **COURSE OUTCOMES**

After successful completion of the course, the students will be able to:

- CO1 Compare the waste of various industries and relate with their toxicity level.
- CO2 Outline various solid industrial waste and their corresponding treatment strategies.
- CO3 Illustrate various aerobic and anaerobic treatment of industrial wastewater

CO4 Implement the advanced treatment technologies for the management of industrial wastes

CO5 Choose efficient cleaner production strategies towards circular economy

**TEXT BOOKS:**

1. Shen, T.T., 1999. Total environmental quality management. In *Industrial Pollution Prevention* (pp. 81-139). Springer, Berlin, Heidelberg.
2. Eckenfelder, W., 2000. *Industrial water pollution control*. McGraw-Hill.
3. O’Leary, P.R. and Tchobanoglous, G., 2002. Landfilling. In *Handbook of solid waste management*. New York: Mcgraw-hill.
4. Metcalf, L., Eddy, H.P. and Tchobanoglous, G., 1991. *Wastewater engineering: treatment, disposal, and reuse* (Vol. 4). New York: McGraw-Hill.

**REFERENCE BOOKS:**

1. Metcalf, L., Eddy, H.P. and Tchobanoglous, G., 1991. *Wastewater engineering: treatment, disposal, and reuse* (Vol. 4). New York: McGraw-Hill.
2. Forster, C.F. and Wase, D.A., 1987. *Environmental biotechnology*.
3. Hendricks, D., 2010. *Fundamentals of water treatment unit processes: physical, chemical, and biological*. CRC Press.

**MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES**

Course Outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	M	L	M	-	L	M	-	L	-	-	-	M	H	-	H
CO2	H	L	H	L	M	-	L	L	-	-	L	H	H	L	H
CO3	H	L	H	L	M	-	L	L	-	-	L	H	H	L	H
CO4	M	L	L	-	M	L	-	M	-	-	-	H	H	L	H
CO5	M	L	L	-	M	L	-	H	-	-	-	H	H	L	H

H – High; M – Medium; L – Low

## REFERENCE BOOKS:

1. King, R.J.B. and Robins, M.W., 2006. *Cancer biology*. Pearson Education.
2. Ruddon, R.W., 2007. *Cancer biology*. Oxford University Press.
3. Knowles, M. and Selby, P., 2005. *Introduction to the cellular and molecular biology of cancer*. Oxford university press.

## MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

Course Outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	H	H	M	M	-	-	L	-	-	M	-	H	H	-	H
CO2	H	H	M	M	-	-	L	-	-	M	-	H	H	-	H
CO3	H	H	M	M	-	-	L	-	-	H	-	H	H	-	H
CO4	H	H	H	H	-	-	H	-	-	H	-	H	H	-	H
CO5	H	H	H	H	-	-	H	-	-	H	-	H	H	-	H

H – High; M – Medium; L – Low

BT1642

## FUNDAMENTAL OF CLINICAL TRIALS

L	T	P	C
3	0	0	3

## OBJECTIVES:

This course enables the students to

- Learn the fundamentals of epidemiologic methods, study design, protocol preparation
- To gain knowledge in the basic bio-statistical techniques involved in clinical research.
- To describe the principals involved in ethical, legal and regulatory issues in clinical trials.

**UNIT I            CLINICAL TRIALS AND DRUG DISCOVERY    9**

General terms in clinical trials – healthy volunteers, inclusion / exclusion criteria, informed consent, patient volunteer, placebo, randomized, single- or double-blind studies, Mortality and morbidity. Types and phases of clinical trials, nonclinical research, ethical conduct during clinical trials. Clinical trial protocol and its components

**UNIT II                FUNDAMENTALS OF TRIAL DESIGN    9**

Randomised clinical trials, uncontrolled trials. Protocol development, endpoints, patient selection, source and control of bias, randomization, blinding, sample size and power.

**UNIT III             ALTERNATE TRIAL DESIGNS    9**

Crossover design, factorial design, equivalence trials, bioequivalence trials, non-inferiority trials, cluster randomized trials, multi-centre trials.

**UNIT IV             CLINICAL DATA ANALYSIS    9**

Types of data and normal distribution, significance tests and confidence intervals, comparison of means, comparison of proportions, analysis of survival data, subgroup analysis, regression analysis, missing data.

**UNIT V             REPORTING OF TRIALS    9**

EPIDATA Software in clinical trials, Overview of reporting, trial profile, presenting baseline data, use of tables, figures, critical appraisal of report, meta-analysis.

**TOTAL: 45 PERIODS**

**COURSE OUTCOMES**

After successful completion of the course, the students will be able to

- CO1    Understand the clinical trial process
- CO2    Design and conduct the clinical trial experiments.
- CO3    Understand the alternative designing in clinical trial.
- CO4    Analyse clinical data by using statistical methods
- CO5    Prepare a complete report on clinical trial experiments



**TEXT BOOKS:**

1. Fundamentals of Clinical Trials, Lawrence M. Friedman, Springer Science & Business Media, 2010
2. Textbook of Clinical Trials, David Machin, Simon Day, Sylvan Green, John Wiley & Sons, 2007
3. Clinical Trials: A Practical Approach, Stuart J. Pocock, John Wiley & Sons, 17-Jul-2013

**REFERENCES:**

1. Clinical trials, A practical guide to design, analysis and reporting. Duolao Wang and Ameet Bakhai. Remedica. 2006.
2. Introduction to statistics in pharmaceutical clinical trials. T.A. Durham and J Rick Turner. Pharmaceutical Press.
3. Clinical Trials: Study Design, Endpoints and Biomarkers, Drug Safety, and FDA and ICH Guidelines, Tom Brody, Academic Press, 2016.

**MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES**

Course Outcomes	PO												PSO		
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	H	H	M	H	H	M	-	H	H	M	M	M	H	-	M
CO2	H	H	H	H	H	M	M	H	H	M	M	M	H	-	H
CO3	H	H	H	H	H	M	M	H	H	H	M	M	H	-	H
CO4	H	H	H	H	H	M	-	H	H	H	M	M	H	-	H
CO5	H	H	H	H	H	M	-	H	H	H	M	M	H	-	H

H – High; M – Medium; L – Low



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C.Nagar, K.Vellakulam - 625 701, (Near Virudhunagar), Madurai District.

## DEPARTMENT OF POLYMER TECHNOLOGY

### B.Tech. POLYMER TECHNOLOGY

### REGULATIONS - 2020 - AUTONOMOUS

### CHOICE BASED CREDIT SYSTEM

## I TO VIII SEMESTERS CURRICULUM AND (III - VIII SEM) SYLLABUS

### Vision of the Department:

To make the Department of Polymer Technology of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

### Mission of the Department:

To impart highly innovative and technical knowledge in the field of Polymer Technology to the urban and unreachable rural student folks through Total Quality Education.

### Program Educational Objectives (PEOs):

**PEO 1:** Graduates will be technically proficient in Polymer Technology with a commitment to quality, timeliness and compete with confidence in their career

**PEO 2:** Graduates will contribute towards research and Professional development and entrepreneurship

**PEO 3:** Graduates will engage in lifelong learning or continuous education Opportunities.

### Program Specific Outcomes (PSOs):

**PSO1. Polymer industry oriented preparedness:** Reveal an ability to identify careers in polymer technology's domains like, synthesis of polymers, processing and quality with adept skills required to work in polymer technology laboratory or manufacturing facility.

**PSO2. Higher Education Preparedness:** Demonstrate an ability to appear for competitive examinations to pursue higher studies.

The credit requirement for the programme B.Tech. Polymer Technology (as per Regulation 2020) is outlined below:

**SEMESTER VII**

<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1	PT1701	Polymer Composites	PC	3	3	0	0	3
2	PT1702	Rubber Product Manufacturing	PC	3	3	0	0	3
3	GE1671	Total Quality Management	HS	3	3	0	0	3
4		Professional Elective III	PE	3	3	0	0	3
5		Professional Elective IV	PE	3	3	0	0	3
6		Open Elective II	OE	3	3	0	0	3
<b>PRACTICALS</b>								
7	PT1711	Computer Aided Mold Design Laboratory -II	PC	4	0	0	4	2
8	PT1712	Polymer blends and composites Laboratory	PC	4	0	0	4	2
9	PT1721	Mini project	EEC	2	0	0	4	2
<b>TOTAL</b>				<b>28</b>	<b>18</b>	<b>0</b>	<b>12</b>	<b>24</b>

**SEMESTER VIII**

<b>S. NO.</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1		Online course-II	OL	3	3	0	0	3
2	PT1821	Project Work	EEC	8	0	0	16	8
<b>TOTAL</b>				<b>11</b>	<b>3</b>	<b>0</b>	<b>16</b>	<b>11</b>

**OBJECTIVES:**

To enable the students to

- Learn the concepts of quality and quality management, TQM framework, Barriers and Benefits of TQM.
- Apply the Principles and techniques of Quality Management for real time.
- Understanding the need and importance of quality assurance and certification.

**UNIT I INTRODUCTION**

9

Concept of Quality and Quality Management- Determinants of quality of product & service-Quality vs. Reliability-- Definition of TQM-- Basic concepts of TQM - TQM Framework- Barriers to TQM –Benefits of TQM.–Gurus of TQM (Brief introduction)- Quality statements – vision, mission, Policy.

**UNIT II PRINCIPLES AND PHILOSOPHIES OF QUALITY MANAGEMENT**

9

Overview of the contributions of Deming, Juran Crosby, Masaaki Imai, Feigenbaum, Ishikawa, Taguchi, Shingeo and Walter Shewhart - Concepts of Quality circle, Japanese 5S principles and 8D methodology.

**UNIT III TOOLS AND TECHNIQUES FOR QUALITY MANAGEMENT**

9

Quality functions development (QFD) – Benefits, Voice of customer, information Organisation, House of quality (HOQ), building a HOQ, QFD process. Failure mode effect analysis (FMEA) – requirements of reliability, failure rate, FMEA stages, design, process and documentation-Taguchi techniques.

**UNIT IV STATISTICAL QUALITY CONTROL**

9

Juran's concept of quality cost-components of Quality Cost- Statistical Quality Control – Inspection, Sampling, Sample Size, Sampling Plan, AQL, OC curve, Producer Risk, Consumer Risk, AOQ, AOQL, Control Charts & Control Limits – X, R & S charts and their application- causes of variations – Assignable & Random; Runs-Test, Chart-Sensitivity Test and Run-Sum Test; Normal-Distribution curve and concept of Six Sigma.

**UNIT V QMS- QUALITY MANAGEMENT SYSTEM**

9

Introduction-Benefits of ISO Registration-ISO 9000 Series of Standards-Sector-Specific Standards - AS 9100, TS16949 and TL 9000-- ISO 9001 Requirements-Implementation-Documentation-Internal Audits-Registration-ENVIRONMENTAL MANAGEMENT SYSTEM: Introduction—ISO 14000 Series Standards—Concepts of

ISO 14001—Requirements of ISO 14001-Benefits of EMS.

TOTAL: 45 PERIODS

OUTCOMES

CO1: Apply TQM concepts in a selected enterprise

CO2: Apply TQM principles in a selected enterprise

CO3: Explain Taguchi's techniques, Performance Measures, QFD and HOQ.

CO4: Explain Six Sigma concept and apply Traditional tools, new tools and Benchmarking for statistical quality control.

CO5: Confirm quality standards and implementing QMS in business organization.

TEXT BOOKS

1. Suganthi L & Anand Samuel, 2004, Total Quality Management, Prentice Hall Publications.

2. Dale H Besterfield, Carol B Michna, Glen H Besterfield, Mary B Sacre, Hemant Urdhwareshe & Rashmi Urdhwareshe, 2013, Total Quality Management, Revised 3rd ed, Indian Reprint, 6th Impression, Pearson Education Asia.

REFERENCE BOOKS

1. Rose JE, 1997, Total Quality Management, S Chand & Co.

2. Kiran DR, 2016, Total Quality Management: Key concepts and case studies, Butterworth – Heinemann Ltd.

3. Shridhara Bhat K, 2016, Total Quality Management: Text and Cases, 2nd ed, Himalaya Publishing House India.

**ANNA UNIVERSITY, CHENNAI**  
**AFFILIATED INSTITUTIONS**  
**B.E. COMPUTER SCIENCE AND ENGINEERING**  
**REGULATIONS – 2017**  
**CHOICE BASED CREDIT SYSTEM**

**PROGRAM EDUCATIONAL OBJECTIVES (PEOs):**

1. To enable graduates to pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs. To ensure that graduates will have the ability and attitude to adapt to emerging technological changes.

**PROGRAM OUTCOMES POs:**

Engineering Graduates will be able to:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

### **PROGRAM SPECIFIC OBJECTIVES (PSOs)**

To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

To apply software engineering principles and practices for developing quality software for scientific and business applications.

To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

#### Mapping of POs/PSOs to PEOs

Contribution	1: Reasonable	2: Significant	3: Strong
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	PEOs	
POs	1. Graduates will pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs.	2. Graduates will have the ability and attitude to adapt to emerging technological changes.
1. <b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	1
2. <b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3	1
3. <b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	3	2
4. <b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	3	2
5. <b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	3
6. <b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.	2	2



<p><b>7. Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.</p>	2	1
<p><b>8. Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.</p>	3	1
<p><b>9. Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.</p>	3	2
<p><b>10. Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.</p>	3	2
<p><b>11. Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.</p>	2	2
<p><b>12. Life-long learning:</b> Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.</p>	1	3

<b>PSOs</b>		
1. Analyze, design and develop computing solutions by applying foundational concepts of computer science and engineering.	3	1
2. Apply software engineering principles and practices for developing quality software for scientific and business applications.	3	1
3. Adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.	1	3

**SEMESTER VII**

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	MG8591	Principles of Management	HS	3	3	0	0	3
2.	CS8792	Cryptography and Network Security	PC	3	3	0	0	3
3.	CS8791	Cloud Computing	PC	3	3	0	0	3
4.		Open Elective II	OE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Professional Elective III	PE	3	3	0	0	3
<b>PRACTICALS</b>								
7.	CS8711	Cloud Computing Laboratory	PC	4	0	0	4	2
8.	IT8761	Security Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>26</b>	<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

**SEMESTER VIII**

SI. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.		Professional Elective IV	PE	3	3	0	0	3
2.		Professional Elective V	PE	3	3	0	0	3
<b>PRACTICALS</b>								
3.	CS8811	Project Work	EEC	20	0	0	20	10
<b>TOTAL</b>				<b>26</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>16</b>

**TOTAL NO. OF CREDITS: 185**

### UNIT III

Introduction to Group Discussion— Participating in group discussions – understanding group dynamics - brainstorming the topic -- questioning and clarifying –GD strategies- activities to improve GD skills

### UNIT IV

Interview etiquette – dress code – body language – attending job interviews– telephone/skype interview -one to one interview &panel interview – FAQs related to job interviews

### UNIT V

Recognizing differences between groups and teams- managing time-managing stress- networking professionally- respecting social protocols-understanding career management-developing a long-term career plan-making career changes

**TOTAL : 30 PERIODS**

### OUTCOMES:

**At the end of the course Learners will be able to:**

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

### Recommended Software

1. Open Source Software
2. Win English

### REFERENCES:

1. Butterfield, Jeff Soft Skills for Everyone. Cengage Learning: New Delhi, 2015
2. E. Suresh Kumar et al. Communication for Professional Success. Orient Blackswan: Hyderabad, 2015
3. Interact English Lab Manual for Undergraduate Students,. OrientBalckSwan: Hyderabad, 2016.
4. Raman, Meenakshi and Sangeeta Sharma. Professional Communication. Oxford University Press: Oxford, 2014
5. S. Hariharanetal. Soft Skills. MJP Publishers: Chennai, 2010.

**MG8591**

**PRINCIPLES OF MANAGEMENT**

**LT P C**

**3 0 0 3**

### OBJECTIVES:

- To enable the students to study the evolution of Management, to study the functions and principles of management and to learn the application of the principles in an organization .

### UNIT I INTRODUCTION TO MANAGEMENT AND ORGANIZATIONS

**9**

Definition of Management – Science or Art – Manager Vs Entrepreneur - types of managers - managerial roles and skills – Evolution of Management – Scientific, human relations , system and contingency approaches – Types of Business organization - Sole proprietorship, partnership, company-public and private sector enterprises - Organization culture and Environment – Current trends and issues in Management.

### UNIT II PLANNING

**9**

Nature and purpose of planning – planning process – types of planning – objectives – setting objectives – policies – Planning premises – Strategic Management – Planning Tools and Techniques – Decision making steps and process.

### UNIT III ORGANISING

**9**

Nature and purpose – Formal and informal organization – organization chart – organization structure – types – Line and staff authority – departmentalization – delegation of authority –

centralization and decentralization – Job Design - Human Resource Management – HR Planning, Recruitment, selection, Training and Development, Performance Management , Career planning and management

**UNIT IV DIRECTING 9**

Foundations of individual and group behaviour – motivation – motivation theories – motivational techniques – job satisfaction – job enrichment – leadership – types and theories of leadership – communication – process of communication – barrier in communication – effective communication –communication and IT.

**UNIT V CONTROLLING 9**

System and process of controlling – budgetary and non-budgetary control techniques – use of computers and IT in Management control – Productivity problems and management – control and performance – direct and preventive control – reporting.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

**TEXTBOOKS:**

1. Stephen P. Robbins & Mary Coulter, “Management”, Prentice Hall (India) Pvt. Ltd., 10<sup>th</sup> Edition, 2009.
2. JAF Stoner, Freeman R.E and Daniel R Gilbert “Management”, Pearson Education, 6th Edition, 2004.

**REFERENCES:**

1. Stephen A. Robbins & David A. Decenzo & Mary Coulter, “Fundamentals of Management” Pearson Education, 7th Edition, 2011.
2. Robert Kreitner & Mamata Mohapatra, “ Management”, Biztantra, 2008.
3. Harold Koontz & Heinz Weihrich “Essentials of management” Tata McGraw Hill,1998.
4. Tripathy PC & Reddy PN, “Principles of Management”, Tata McGraw Hill, 1999

<b>CS8792</b>	<b>CRYPTOGRAPHY AND NETWORK SECURITY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**OBJECTIVES:**

- To understand Cryptography Theories, Algorithms and Systems.
- To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

**UNIT I INTRODUCTION 9**

Security trends - Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies - Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography- Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

**UNIT II SYMMETRIC KEY CRYPTOGRAPHY 9**

MATHEMATICS OF SYMMETRIC KEY CRYPTOGRAPHY: Algebraic structures - Modular arithmetic-Euclid’s algorithm- Congruence and matrices - Groups, Rings, Fields- Finite fields- SYMMETRIC KEY CIPHERS: SDES – Block cipher Principles of DES – Strength of DES – Differential and linear cryptanalysis - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – Advanced Encryption Standard - RC4 –



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S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

**B.E. CIVIL ENGINEERING  
REGULATIONS – 2021  
AUTONOMOUS SYLLABUS  
CHOICE BASED CREDIT SYSTEM  
III TO IV SEMESTER CURRICULUM AND SYLLABI**

**VISION:**

To make the Department of Civil Engineering, unique of its kind to promote education and research in the various fields of construction industry.

**MISSION:**

To impart highly innovative and technical knowledge in the field of Civil Engineering to the urban and rural student folks through “Total Quality Education”.

**PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):**

- PEO 1:** Graduates of the program will be creative, able to apply scientific knowledge and computer aided design tools for technical problems in the field of Civil Engineering.
- PEO 2:** Graduates of the program will be a professional Civil Engineer and/or will pursue higher education in various domains of Civil Engineering by taking competitive examinations.
- PEO 3:** Graduates of the program will passionately perform as a competent team member, team leader and/or entrepreneur in the development of a sustainable environment.

**PROGRAM OUTCOMES:**

After going through the four years of study, the Civil Engineering graduates will have the ability to

<b>POs</b>	<b>Graduate Attribute</b>	<b>Programme Outcome</b>
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	Design/Development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and

		demonstrate the knowledge of, and need for sustainable development.
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

**PSO1 :** Graduating students will be able to deal complex problems in the field of Civil Engineering to achieve design solutions with modern technological approach and application software.

**PSO2 :** Graduating students will be able to understand the professional Civil Engineering practice and apply contextual knowledge with the appropriate consideration of the society and environment.



**REGULATIONS - 2021**  
**CHOICE BASED CREDIT SYSTEM**  
**B.E. CIVIL ENGINEERING**  
**CURRICULUM AND SYLLABI FOR SEMESTER III TO IV**  
**SEMESTER III**

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1	MA2202	Transforms and Numerical Solution of Equations	BS	4	3	1	0	4
2	CE2201	Construction Materials	PC	3	3	0	0	3
3	CE2202	Fluid Mechanics	PC	3	3	0	0	3
4	CE2203	Mechanics of Solids	PC	3	3	0	0	3
5	CE2204	Surveying	PC	3	3	0	0	3
6	GE2201	Design Thinking	EM	3	3	0	0	3
7		Audit Course	AU	3	3	0	0	0
<b>PRACTICALS</b>								
8	CE2205	Computer Aided Building Drawing Laboratory	PC	4	0	0	4	2
9	CE2206	Surveying Laboratory	PC	4	0	0	4	2
10	EM2202	Interpersonal Skills - Listening and Speaking	EM	2	0	0	2	1
<b>TOTAL</b>				<b>32</b>	<b>21</b>	<b>1</b>	<b>10</b>	<b>24</b>

**SEMESTER IV**

S.NO.	COURSE CODE	COURSE TITLE	CATE GORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1	MA2254	Probability, Statistics and Numerical Methods	BS	4	3	1	0	4
2	CE2251	Applied Hydraulic Engineering	PC	3	3	0	0	3
3	CE2252	Concrete Technology	PC	3	3	0	0	3
4	CE2253	Environmental Engineering	PC	3	3	0	0	3
5	CE2254	Geotechnical Engineering – I	PC	3	3	0	0	3
6	CE2255	Strength of Materials	PC	4	3	1	0	4
7	GE2251	Quantitative Aptitude	EM	1	1	0	0	1
8	AUD110	Tamils and Technology	AU	1	1	0	0	0
<b>PRACTICALS</b>								
9	CE2256	Geotechnical Laboratory	PC	3	0	0	3	1
10	CE2257	Strength of Materials Laboratory	PC	3	0	0	3	1
11	EM2252	An Introduction to Advanced Reading and Writing	EM	2	0	0	2	1
<b>TOTAL</b>				<b>30</b>	<b>20</b>	<b>2</b>	<b>8</b>	<b>24</b>

Course Code	Course Name	L	T	P	C
CE2253	ENVIRONMENTAL ENGINEERING	3	0	0	3

**Category: Professional Core Course**

**a. Preamble**

This course is to introduce students to various components and design of water supply scheme, water treatment methods, water storage distribution system, sewage treatment, disposal and sewerage system.

**b. Course Outcome**

After successful completion of the course, the students will be able to

CO. No.	Course Outcome	Knowledge Level
CO1	Understand the various components of water supply scheme, intake structure and design of conveyance system for water transmission	K2
CO2	Understand the process of conventional treatment and design of water process and knowledge about the recent advances in water treatment	K2
CO3	Design and evaluate water distribution system and water supply in buildings.	K3
CO4	Estimate sewage generation and design sewer system including sewage pumping stations.	K3
CO5	Understand the self-purification of streams and sludge and sewage disposal methods, selection of treatment process and design of wastewater treatment system	K2

**c. Course Syllabus**

**Total : 45 Periods**

**SOURCE AND CONVEYANCE OF WATER SUPPLY SYSTEMS**

**9**

Planning - Objectives - Population forecasting - Design period - Water demand - Sources and characteristics of water - Source selection - Water quality parameters & significance - Standards – Intake structures - Conveyance - Pipes - Mains design - Pumps - Pump selection.

**WATER TREATMENT**

**9**

Objectives - Unit operations and processes - Principles, functions of Chemical feeding, flash mixers, flocculators - Design of sedimentation tanks and sand filters - Disinfection -

Construction, operation and maintenance aspects of water treatment plants - Aeration - Iron and manganese removal, defluoridation and demineralization - Water softening - Desalination - Membrane Systems.

## **WATER STORAGE AND DISTRIBUTION 9**

Requirements of water distribution - Components - Service reservoirs - Network design - Leak detection methods - Principles of design of water supply in buildings - House service connection - Fixtures and fittings.

## **PLANNING AND DESIGN OF SEWERAGE SYSTEM 9**

Sources of waste water - Characteristics and composition of sewage - Population equivalent - Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage- Storm runoff estimation - Sewer appurtenances - Corrosion in sewers - Prevention and control – Sewage pumping-drainage in buildings - Plumbing systems for drainage

## **SEWAGE TREATMENT AND DISPOSAL 9**

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems - Trickling filters - Sequencing Batch Reactor(SBR) - UASB – Waste Stabilization Ponds - Other treatment methods - Reclamation and Reuse of sewage – Recent Advances in Sewage Treatment - Discharge standards-sludge treatment - Disposal of sludge

### **d. Activities**

Visit to wastewater treatment plant to know about the realtime working of treatment facility.

### **e.Learning Resources**

#### **Text Books**

1. Garg, S.K, 2015, *Environmental Engineering, Vol.I & Vol.II* Khanna Publishers, New Delhi.
2. Modi, P.N., 2016, *Water Supply Engineering, Vol.I & Vol II* Standard Book House, New Delhi.
3. Duggal K.N., 2014, *Elements of Environmental Engineering* S. Chand and Co. Ltd., New Delhi.
4. Punmia, B.C., Jain, A.K., and Jain.A.K., *Environmental Engineering, Vol I & Vol.II*, Laxmi

### **Reference Books**

1. Manual on Water Supply and Treatment, CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 1999.
2. Syed R. Qasim and Edward M. Motley Guang Zhu, 2009, *Water Works Engineering Planning, Design and Operation*, Prentice Hall of India Learning Private Limited, New Delhi.
3. Metcalf and Eddy, 2010, *Waste water Engineering – Treatment and Reuse*, Tata Mc. Graw – Hill Company, New Delhi.
4. Syed R. Qasim, 2010, *Waste water Treatment Plants*, CRC Press, Washington D.C.



**(An Autonomous Institution** - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near **VIRUDHUNAGAR**).

**B.E. CIVIL ENGINEERING**

**(Regulation 2020 - Autonomous)**

**CHOICE BASED CREDIT SYSTEM (CBCS)**

**CURRICULUM AND SYLLABI (V TO VI Semester)**

### **Vision**

To make the Department of Civil Engineering, unique of its kind to promote education and research in the various fields of construction industry.

### **Mission**

To impart highly innovative and technical knowledge in the field of Civil Engineering to the urban and rural student folks through "Total Quality Education".

### **Program Education Objectives:**

Educational objectives of the course Bachelor of Civil Engineering programme can be divided into

1. **Program Specific Academic Excellence:** Graduates of the program will be creative, able to apply scientific knowledge and computer aided design tools for technical problems in the field of Civil Engineering.
2. **Professional Attitude:** Graduates of the program will be a professional Civil Engineer and/or will pursue higher education in various domains of Civil Engineering by taking competitive examinations.
3. **Core Competence:** Graduates of the program will passionately perform as a competent team member, team leader and/or entrepreneur in the development of a sustainable environment.

## PROGRAM OUTCOMES:

After going through the four years of study, the Civil Engineering graduates will have the ability to

<b>PO No.</b>	<b>Graduate Attribute</b>	<b>Programme Outcome</b>
1	Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	Problem analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3	Design/development of solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice

7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change

### **PROGRAMME SPECIFIC OUTCOMES (PSOs):**

1. **Future ready graduates:** Graduating students will be able to deal complex problems in the field of Civil Engineering to achieve design solutions with modern technological approach and application software.

2. **Socially Aware graduates:** Graduating students will be able to understand the professional Civil Engineering practice and apply contextual knowledge with the appropriate consideration of the society and environment.

**SEMESTER V**

<b>S. No</b>	<b>COURSE CODE</b>	<b>COURSE TITLE</b>	<b>CATEGORY</b>	<b>CONTACT PERIODS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>THEORY</b>								
1.	CE1501	Design of Reinforced Cement Concrete Elements	PC	3	3	0	0	3
2.	CE1502	Foundation Engineering	PC	3	3	0	0	3
3.	CE1503	Structural Analysis I	PC	3	3	0	0	3
4.	CE1504	Water Supply Engineering	PC	3	3	0	0	3
5.	CE1505	Concrete and Highway Engineering (Theory cum Lab)	PC	5	3	0	2	4
6.		Open Elective*	OE	3	3	0	0	3
7.		Online Course**	OL	NPTEL/SWAYAM				
8.		Audit Course	AC	3	3	0	0	0
<b>PRACTICALS</b>								
9.	CE1511	Hydraulic Engineering Laboratory	PC	4	0	0	4	2
10.	CE1521	Survey Camp	EEC	0	0	0	0	2
11.	HS1521	Professional Communication	EEC	2	0	0	2	1
<b>TOTAL</b>				<b>29</b>	<b>21</b>	<b>0</b>	<b>8</b>	<b>24</b>



## SEMESTER VI

S. No	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	CE1601	Design of Steel Structural Elements	PC	3	3	0	0	3
2.	CE1602	Structural Analysis II	PC	3	3	0	0	3
3.	CE1603	Wastewater Engineering	PC	3	3	0	0	3
4.		Professional Elective I	PE	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Online Course**	OL	NPTEL/SWAYAM				3
<b>PRACTICALS</b>								
7.	CE1611	Computer Aided Design and Drafting Laboratory	PC	4	0	0	4	2
8.	CE1612	Water and Waste Water Analysis Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>23</b>	<b>15</b>	<b>0</b>	<b>8</b>	<b>22</b>

\*\*Students can take online courses in any of the three semesters (5th, 6th, and 7th) for a total of 6 credits, and grades will be awarded in the consolidated mark statement accordingly.

L	T	P	C
3	0	0	3

**Course Objectives:**

- The objectives of this course is to help students develop the ability to apply basic understanding of physical, chemical, and biological phenomena for successful design, operation and maintenance of sewage treatment plants.

**UNIT I PLANNING AND DESIGN OF SEWERAGE SYSTEM 9**

Characteristics and composition of sewage - population equivalent -Sanitary sewage flow estimation - Sewer materials - Hydraulics of flow in sanitary sewers - Sewer design - Storm drainage-Storm runoff estimation - sewer appurtenances - corrosion in sewers - prevention and control - sewage pumping-drainage in buildings-plumbing systems for drainage - Rain Water ting.

**UNIT II PRIMARY TREATMENT OF SEWAGE 9**

Objectives - Unit Operations and Processes - Selection of treatment processes -- Onsite sanitation - Septic tank- Grey water harvesting - Primary treatment - Principles, functions and design of sewage treatment units - screens - grit chamber-primary sedimentation tanks - Construction, Operation and Maintenance aspects.

**UNIT III SECONDARY TREATMENT OF SEWAGE 9**

Objectives - Selection of Treatment Methods - Principles, Functions, - Activated Sludge Process and Extended aeration systems -Trickling filters- Sequencing Batch Reactor(SBR) - Membrane Bioreactor - UASB - Waste Stabilization Ponds - - Other treatment methods -Reclamation and Reuse of sewage - Advanced Treatment Technologies Concept and Case studies - Ozonation, Electro coagulation, Fenton, Photo Fenton.

**UNIT IV DISPOSAL OF SEWAGE 9**

Standards for- Disposal - Methods - dilution - Mass balance principle - Self-purification of river- Oxygen sag curve - deoxygenation and reaeration - Streeter-Phelps model - Land disposal - Sewage farming - sodium hazards - Soil dispersion system.

**UNIT V SLUDGE TREATMENT AND DISPOSAL 9**

Objectives - Sludge characterization - Thickening - Design of gravity thickener- Sludge digestion- Standard rate and High-rate digester design- Biogas recovery - Sludge Conditioning and Dewatering - Sludge drying beds- ultimate residue disposal - recent advances.

**TOTAL:45 PERIODS**

## COURSE OUTCOMES

Upon successful completion of course the students will be able to

CO 1 Apply the concept of sewage Collection, Conveyance along with the components like appurtenances, pumps & plumbing systems for Building.

CO 2 Solve the various Primary wastewater treatment units.

CO 3 Solve the Secondary and Advanced wastewater treatment units.

CO 4 Illustrate the disposal methods and standards for sewage.

CO 5 Outline treatments and disposal methods for sludge.

### TEXT BOOKS:

1.Garg, S.K.,2015, *Environmental Engineering* Vol. II, Khanna Publishers, New Delhi.

2.Duggal K.N.,2014, *Elements of Environmental Engineering* S.Chand and Co. Ltd., New Delhi.

3.Punmia, B.C., Jain, A.K., and Jain.A.K.,2010,*Environmental Engineering*, Vol.II, Laxmi Publications.

### REFERENCES:

1.*Manual on Sewerage and Sewage Treatment Systems*, 2013, Part A,B and C, CPHEEO, Ministry of Urban Development, Government of India, New Delhi,

2.Metcalf and Eddy, 2010, *Wastewater Engineering*, Treatment and Reuse, TataMc.Graw-Hill Company, New Delhi.

3.Syed R. Qasim, 2010,*Wastewater Treatment Plants*, CRC Press, WashingtonD.C.

4.Gray N.F, 2006, *Water Technology*, Elsevier India Pvt. Ltd., New Delhi.

## MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES

CE1603

WASTE WATER ENGINEERING

Course Outcomes	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	M	L	-	-	-	M	3	L	-	-	-	-	L	M
CO2	H	M	L	L	-	H	M	L	-	-	L	-	M	H
CO3	H	M	L	L	-	H	M	L	-	-	L	-	M	H
CO4	H	M	L	L	-	H	M	L	-	-	L	-	M	H
CO5	M	L	-	-	-	M	H	L	-	-	-	-	L	M

H - High; M - Medium; L - Low

**CE1612 WATER AND WASTE WATER  
ANALYSIS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>

**COURSE OBJECTIVES:**

- To analyse the physical, chemical and biological characteristics of water and wastewater
- To quantify the dosage requirement for coagulation process
- To study the growth of micro-organism and its quantification
- To quantify the sludge

**Course Content:**

1. Physical, Chemical and biological characteristics of water and wastewater
2. Jar test
3. Chlorine demand and residual test
4. Growth of micro-organism

**COURSE OUTCOME:**

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

- Quantify the pollutant concentration in water and wastewater
- Suggest the type of treatment required and amount of dosage required for the treatment
- Examine the conditions for the growth of micro-organisms

**TOTAL: 60 PERIODS**

**List of Experiments:**

1. Determination of pH, Turbidity and conductivity
2. Determination of Hardness
3. Determination of Alkalinity and Acidity
4. Determination of Chlorides
5. Determination of Phosphates and Sulphates
6. Determination of iron and fluoride
7. Determination of Optimum Coagulant dosage
8. Determination of residual chlorine and available chlorine in bleaching powder
9. Determination of Oil, and Grease

10. Determination of suspended, settleable, volatile and fixed solids
11. Determination Dissolved Oxygen and BOD for the given sample
12. Determination of COD for given sample
13. Determination of SVI of Biological sludge and microscopic examination
14. Determination of MPN index of given water sample
15. Reverse Osmosis process Unit. (Demo only)
16. Biological Wastewater Treatment (Demo only)

**Course Outcome:**

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

- CO1 inspect the physical parameters of wastewater
- CO2 examine the coagulation and flocculation process
- CO3 test the organic materials in wastewater
- CO4 examine the inorganic ions in wastewater
- CO5 examine the Bacteriological characteristics of wastewater

**MAPPING OF COURSE OUTCOMES WITH PROGRAM OUTCOMES**

**CE1612 – WATER AND WASTE WATER ANALYSIS LAB**

Course Outcomes	PO												PSO	
	1	2	3	4	5	6	7	8	9	10	11	12	1	2
CO1	H	H	M	-	-	M	H	-	H	-	-	-	-	M
CO2	H	H	M	-	-	M	H	-	H	-	-	-	-	M
CO3	H	H	M	-	-	M	H	-	H	-	-	-	-	M
CO4	H	H	M	-	-	M	H	-	H	-	-	-	-	M
CO5	H	H	M	-	-	M	H	-	H	-	-	-	-	M

H - High; M - Medium; L - Low

**ANNA UNIVERSITY, CHENNAI**  
**AFFILIATED INSTITUTIONS**  
**B.E. ELECTRICAL AND ELECTRONICS ENGINEERING**  
**REGULATIONS – 2017**  
**CHOICE BASED CREDIT SYSTEM**

**Educational Objectives**

Bachelor of Electrical and Electronics Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

1. Have successful technical and professional careers in their chosen fields such as circuit theory, Field theory, control theory and computational platforms.
2. Engross in life long process of learning to keep themselves abreast of new developments in the field of Electronics and their applications in power engineering.

**Programme Outcomes**

The graduates will have the ability to

- a. Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering.
- b. Identify and formulate Electrical and Electronics Engineering problems from research literature and be able to analyze the problem using first principles of Mathematics and Engineering Sciences.
- c. Come out with solutions for the complex problems and to design system components or process that fulfill the particular needs taking into account public health and safety and the social, cultural and environmental issues.
- d. Draw well-founded conclusions applying the knowledge acquired from research and research methods including design of experiments, analysis and interpretation of data and synthesis of information and to arrive at significant conclusion.
- e. Form, select and apply relevant techniques, resources and Engineering and IT tools for Engineering activities like electronic prototyping, modeling and control of systems and also being conscious of the limitations.
- f. Understand the role and responsibility of the Professional Electrical and Electronics Engineer and to assess societal, health, safety issues based on the reasoning received from the contextual knowledge.
- g. Be aware of the impact of professional Engineering solutions in societal and environmental contexts and exhibit the knowledge and the need for Sustainable Development.
- h. Apply the principles of Professional Ethics to adhere to the norms of the engineering practice and to discharge ethical responsibilities.
- i. Function actively and efficiently as an individual or a member/leader of different teams and multidisciplinary projects.
- j. Communicate efficiently the engineering facts with a wide range of engineering community and others, to understand and prepare reports and design documents; to make effective presentations and to frame and follow instructions.
- k. Demonstrate the acquisition of the body of engineering knowledge and insight and Management Principles and to apply them as member / leader in teams and multidisciplinary environments.
- l. Recognize the need for self and life-long learning, keeping pace with technological challenges in the broadest sense.

PEO \ PO	a	b	c	d	e	f	g	h	i	j	k	l
1	✓	✓	✓	✓	✓	✓	✓					✓
2	✓	✓	✓	✓	✓	✓	✓	✓		✓		

**SEMESTER VII**

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	EE8701	High Voltage Engineering	PC	3	3	0	0	3
2.	EE8702	Power System Operation and Control	PC	3	3	0	0	3
3.	EE8703	Renewable Energy Systems	PC	3	3	0	0	3
4.		Open Elective II*	OE	3	3	0	0	3
5.		Professional Elective III	PE	3	3	0	0	3
6.		Professional Elective IV	PE	3	3	0	0	3
<b>PRACTICALS</b>								
7.	EE8711	Power System Simulation Laboratory	PC	4	0	0	4	2
8.	EE8712	Renewable Energy Systems Laboratory	PC	4	0	0	4	2
<b>TOTAL</b>				<b>26</b>	<b>18</b>	<b>0</b>	<b>8</b>	<b>22</b>

**SEMESTER VIII**

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.		Professional Elective V	PE	3	3	0	0	3
2.		Professional Elective VI	PE	3	3	0	0	3
<b>PRACTICALS</b>								
3.	EE8811	Project Work	EEC	20	0	0	20	10
<b>TOTAL</b>				<b>26</b>	<b>6</b>	<b>0</b>	<b>20</b>	<b>16</b>

**TOTAL NO. OF CREDITS: 180**

\*Course from the curriculum of other UG Programmes.

**PROFESSIONAL ELECTIVE – I ( VI SEMESTER)**

S.NO.	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
1.	IC8651	Advanced Control System	PE	4	2	2	0	3
2.	EE8001	Visual Languages and Applications	PE	3	3	0	0	3
3.	EE8002	Design of Electrical Apparatus	PE	3	3	0	0	3
4.	EE8003	Power Systems Stability	PE	3	3	0	0	3
5.	EE8004	Modern Power Converters	PE	3	3	0	0	3
6.	GE8075	Intellectual Property Rights	PE	3	3	0	0	3

**PROFESSIONAL ELECTIVE – II ( VI SEMESTER)**

1.	RO8591	Principles of Robotics	PE	3	3	0	0	3
2.	EE8005	Special Electrical Machines	PE	3	3	0	0	3
3.	EE8006	Power Quality	PE	3	3	0	0	3
4.	EE8007	EHVAC Transmission	PE	3	3	0	0	3
5.	EC8395	Communication Engineering	PE	3	3	0	0	3

**PROFESSIONAL ELECTIVE – III ( VII SEMESTER)**

1.	GE8071	Disaster Management	PE	3	3	0	0	3
2.	GE8074	Human Rights	PE	3	3	0	0	3
3.	MG8491	Operations Research	PE	3	3	0	0	3
4.	MA8391	Probability and Statistics	PE	4	4	0	0	4
5.	EI8075	Fibre Optics and Laser Instrumentation	PE	3	3	0	0	3
6.	GE8072	Foundation Skills in Integrated Product Development	PE	3	3	0	0	3

**PROFESSIONAL ELECTIVE – IV ( VII SEMESTER)**

1.	EE8008	System Identification and Adaptive Control	PE	3	3	0	0	3
2.	CS8491	Computer Architecture	PE	3	3	0	0	3
3.	EE8009	Control of Electrical Drives	PE	3	3	0	0	3
4.	EC8095	VLSI Design	PE	3	3	0	0	3
5.	EE8010	Power Systems Transients	PE	3	3	0	0	3
6.	GE8077	Total Quality Management	PE	3	3	0	0	3



**PROFESSIONAL ELECTIVE – V ( VIII SEMESTER)**

1.	EE8011	Flexible AC Transmission Systems	PE	3	3	0	0	3
2.	EE8012	Soft Computing Techniques	PE	3	3	0	0	3
3.	EE8013	Power Systems Dynamics	PE	3	3	0	0	3
4.	EE8014	SMPS and UPS	PE	3	3	0	0	3
5.	EE8015	Electric Energy Generation, Utilization and Conservation	PE	3	3	0	0	3
6.	GE8076	Professional Ethics in Engineering	PE	3	3	0	0	3
7.	MG8591	Principles of Management	PE	3	3	0	0	3

**PROFESSIONAL ELECTIVE – VI ( VIII SEMESTER)**

1.	EE8016	Energy Management and Auditing	PE	3	3	0	0	3
2.	CS8391	Data Structures	PE	3	3	0	0	3
3.	EE8017	High Voltage Direct Current Transmission	PE	3	3	0	0	3
4.	EE8018	Microcontroller Based System Design	PE	3	3	0	0	3
5.	EE8019	Smart Grid	PE	3	3	0	0	3
6.	EI8073	Biomedical Instrumentation	PE	3	3	0	0	3
7.	GE8073	Fundamentals of Nanoscience	PE	3	3	0	0	3

**\*Professional Electives are grouped according to elective number as was done previously.**

**OBJECTIVES:**

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

**UNIT I INTRODUCTION TO DISASTERS****9**

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability - Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don'ts during various types of Disasters.

**UNIT II APPROACHES TO DISASTER RISK REDUCTION (DRR)****9**

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

**UNIT III INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT****9**

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenarios in the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

**UNIT IV DISASTER RISK MANAGEMENT IN INDIA****9**

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

**UNIT V DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS****9**

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

The students will be able to

- Differentiate the types of disasters, causes and their impact on environment and society
- Assess vulnerability and various methods of risk reduction measures as well as mitigation.
- Draw the hazard and vulnerability profile of India, Scenarios in the Indian context, Disaster damage assessment and management.

**TEXT BOOKS:**

1. Singhal J.P. “Disaster Management”, Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2. Tushar Bhattacharya, “Disaster Science and Management”, McGraw Hill India Education Pvt. Ltd.,2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
3. Gupta Anil K, Sreeja S. Nair. Environmental Knowledge for Disaster Risk Management, NIDM, New Delhi, 2011
4. Kapur Anu Vulnerability India: A Geographical Study of Disasters, IAS and Sage Publishers, New Delhi, 2010.

**REFERENCES:**

1. Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2. Government of India, National Disaster Management Policy,2009



(An Autonomous Institution - AFFILIATED TO ANNA UNIVERSITY, CHENNAI)

S.P.G.Chidambara Nadar - C.Nagammal Campus

S.P.G.C. Nagar, K.Vellakulam – 625 701 (Near VIRUDHUNAGAR).

## **Department of Electrical and Electronics Engineering**

### **B.E. Electrical and Electronics Engineering**

**(Regulations 2020 – Autonomous)**

#### **Vision of the Department:**

To make the Department of Electrical and Electronics Engineering of this Institution the unique of its kind in the field of Research and Development activities in this part of the world.

#### **Mission of the Department:**

Department of Electrical and Electronics Engineering is committed to

1. Inculcate technical knowledge by providing well-balanced curriculum to the urban and unreachable rural student community through “Total Quality Education”
2. Induce leadership and entrepreneurial skills with high standard of ethics and moral values to the student community.
3. Impart innovative skills to the student community by effectively involving them in research activities.
4. Create a wholesome environment to promote effective interaction of students with the industry experts

#### **Program Educational Objectives (PEOs):**

Graduates of the programme will be able to

##### **1. Technical Knowledge:**

Apply Technical knowledge acquired in the field of Electrical and Electronics Engineering and allied areas for practical or industrial problems for a successful professional career

##### **2. Problem Solving:**

Develop and envisage appropriate solutions for real time technological problems faced by the industries and society.

### **3. Personality Development**

Demonstrate interpersonal skills, soft skills and leadership quality blended with ethical and social responsibility for a prospective career

### **4. Life Long Learning:**

Habituate life-long learning so as to adapt to the emerging needs of the profession

### **Program Specific Outcomes (PSOs):**

**PSO 1:** Ability to design and solve engineering problems by applying the fundamental knowledge of Engineering Mathematics, Basic Sciences, Electrical and Electronics Engineering.

**PSO 2:** Ability to understand the recent technological developments in Electrical & Electronics Engineering and develop products / software to cater the Societal & Industrial needs.

### SEMESTER V

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
<b>Theory</b>								
1.	EE1501	Power System Analysis	PC	3	3	0	0	3
2.	EE1571	Control Systems	PC	4	3	1	0	4
3.	EE1572	Microprocessors and Microcontrollers	PC	3	3	0	0	3
4.		Professional Elective I	PE	3	3	0	0	3
5.		Open Elective I	OE	3	3	0	0	3
6.		Audit Course II	AU	3	3	0	0	0
<b>Practical</b>								
7.	EE1511	Control and Instrumentation Laboratory	PC	4	0	0	4	2
8.	EE1581	Microprocessors and Microcontrollers Laboratory	PC	4	0	0	4	2
9.	EE1521	Presentation Skills and Technical Seminar	EEC	2	0	0	2	1
<b>Total</b>				<b>29</b>	<b>18</b>	<b>1</b>	<b>10</b>	<b>21</b>

### SEMESTER VI

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
<b>Theory</b>								
1.	EE1601	Power Electronics and Drives	PC	3	3	0	0	3
2.	EE1602	Protection and Switchgear	PC	3	3	0	0	3
3.	EE1603	Renewable Energy Systems	PC	3	3	0	0	3
4.	EE1671	Digital Signal Processing	PC	3	3	0	0	3
5.		Professional Elective II	PE	3	3	0	0	3
6.		Online Course I*	OL	3	3	0	0	3
<b>Practical</b>								
7.	EE1611	Power Electronics and Drives Laboratory	PC	4	0	0	4	2
8.	EE1612	Renewable Energy Systems Laboratory	PC	4	0	0	4	2
9.	HS1621	Verbal Reasoning and Aptitude	EEC	2	0	0	2	1
<b>Total</b>				<b>28</b>	<b>18</b>	<b>0</b>	<b>10</b>	<b>23</b>

\*Total of 3 credits to be earned before the end of 7<sup>th</sup> Semester

### Professional Elective Courses (PE)

S. No.	Course Code	Course Name	Category	Contact Periods	Credits			
					L	T	P	C
<b>Professional Elective I (5<sup>th</sup> Semester)</b>								
1.	EE1531	Design of Electrical Apparatus	PE	3	3	0	0	3
2.	EE1532	Internet of Things and Its Applications	PE	3	3	0	0	3
3.	EE1533	Machine Learning Applications for Electrical Engineering	PE	3	3	0	0	3
4.	EE1534	Power System Transients	PE	3	3	0	0	3
5.	EE1535	Special Electrical Machines	PE	3	3	0	0	3
<b>Professional Elective II (6<sup>th</sup> Semester)</b>								
1.	EE1631	Advanced Control Systems	PE	3	3	0	0	3
2.	EE1632	Electric Vehicles and Energy Management	PE	3	3	0	0	3
3.	EE1633	Energy Storage Technology	PE	3	3	0	0	3
4.	EE1634	Power Quality	PE	3	3	0	0	3
5.	EE1635	Principles of Robotics	PE	3	3	0	0	3

### Open Electives offered by Department of EEE

S. No.	Course Code	Course Name	Category	Contact Periods	Credits				Offered to Dept.
					L	T	P	C	
<b>Open Elective I (5<sup>th</sup> Semester)</b>									
1.	OEE151	Bio Electronics	OE	3	3	0	0	3	BT
2.	OEE152	Control System Analysis	OE	3	3	0	0	3	AD, CSE, IT
3.	OEE153	Green Building	OE	3	3	0	0	3	MECH, MTR, CIVIL
4.	OEE154	Renewable Energy Sources	OE	3	3	0	0	3	ALL
5.	OEE155	Soft Computing Techniques and Applications	OE	3	3	0	0	3	ALL

**OBJECTIVES:**

- To analyze topology of the stand-alone and grid connected photo-voltaic systems.
- To outline the various forms of wind energy conversion systems.
- To outline the concept of other non-conventional energy sources such as bio mass, hydro, ocean, geothermal etc.

**UNIT I RENEWABLE ENERGY (RE) SOURCES 9**

Environmental consequences of fossil fuel use, Importance of renewable sources of energy, Sustainable Design and development, Types of RE sources(solar, wind, biomass, ocean and geothermal), Limitations of RE sources, Present Indian and international energy scenario of conventional and RE sources.

**UNIT II WIND ENERGY 9**

Basics of wind energy- Classification of wind turbine: Horizontal Axis wind turbine and Vertical axis wind turbine-Power in the Wind – Types of Wind Power Plants(WPPs)–Components of WPPs-Working of WPPs(DFIG,PMSG & SCIG based WPPs)- Siting of WPPs-Grid Connected and Stand alone WPPs

**UNIT III SOLAR PV AND THERMAL SYSTEMS 9**

Solar Radiation, Radiation Measurement, Solar Thermal Power Plant, Central Receiver Power Plants, Solar Ponds.- Thermal Energy storage system with PCM- Solar Photovoltaic systems : Basic Principle of SPV conversion – Types of PV Systems- Types of Solar Cells, Photovoltaic cell concepts: Cell, module, array ,PV Module I-V Characteristics, Efficiency & Quality of the Cell, series and parallel connections, maximum power point tracking (P&O and Incremental conductance algorithm), Applications.

**UNIT IV BIOMASS & OTHER RE SOURCES 9**

Introduction-Bio mass resources –Energy from Bio mass: conversion processes-Biomass Cogeneration-Environmental Benefits. Geothermal Energy: Basics, Direct Use, Geothermal Electricity. Mini/micro hydro power: Classification of hydropower schemes, Essential components of hydroelectric system, Pumped Storage in Hydro power plants.

**UNIT V OCEAN & MODERN ENERGY SOURCES 9**

Tidal Energy: Energy from the tides, Barrage and Non Barrage Tidal power systems. Wave Energy: Energy from waves, wave power devices. Ocean Thermal Energy Conversion (OTEC)- Hydrogen Production and Storage- Fuel cell : Principle of working- various types - construction and applications. Energy Storage System- Hybrid Energy Systems.

**TOTAL: 45 PERIODS****OUTCOMES:**

Upon Successful Completion of this course, the students will be able

CO1: To explain the importance of various renewable energy sources and its existing scenario in world.

CO2: To Analyze the different configurations of the wind energy conversion systems.

CO3: To Develop a stand-alone photo voltaic system with MPPT algorithm.

CO4: To Discuss the basic concepts of Biomass Energy and other renewable energy sources such as hydro, geothermal etc.



CO5: To elucidate the concepts of Ocean and modern energy sources such as fuel cell, batteries etc.

**TEXT BOOKS:**

1. Khan, B.H., 2006. *Non-conventional energy resources*. Tata McGraw-Hill Education

**REFERENCES:**

1. Joshua Earnest, Tore Wizeliu, 'Wind Power Plants and Project Development', PHI Learning Pvt.Ltd, New Delhi, 2011.
2. D.P.Kothari, K.C Singal, Rakesh Ranjan "Renewable Energy Sources and Emerging Technologies", PHI Learning Pvt.Ltd, New Delhi, 2013.
3. Scott Grinnell, "Renewable Energy & Sustainable Design", CENGAGE Learning, USA, 2016.
4. Bradley A. Striebig, Adebayo A.Ogundipe and Maria Papadakis, "Engineering Applications in Sustainable Design and Development", Cengage Learning India Private Limited, Delhi, 2016.
5. Solanki, C.S., 2015. *Solar photovoltaics: fundamentals, technologies and applications*. Phi learning pvt. Ltd..

**ANNA UNIVERSITY, CHENNAI**  
**AFFILIATED INSTITUTIONS**  
**B.E. MECHANICAL ENGINEERING**  
**REGULATIONS – 2017**  
**CHOICE BASED CREDIT SYSTEM**

**PROGRAMME EDUCATIONAL OBJECTIVES:**

Bachelor of Mechanical Engineering curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to

1. Have a successful career in Mechanical Engineering and allied industries.
2. Have expertise in the areas of Design, Thermal, Materials and Manufacturing.
3. Contribute towards technological development through academic research and industrial practices.
4. Practice their profession with good communication, leadership, ethics and social responsibility.
5. Graduates will adapt to evolving technologies through life-long learning.

**PROGRAMME OUTCOMES**

1. An ability to apply knowledge of mathematics and engineering sciences to develop mathematical models for industrial problems.
2. An ability to identify, formulates, and solve complex engineering problems. with high degree of competence.
3. An ability to design and conduct experiments, as well as to analyze and interpret data obtained through those experiments.
4. An ability to design mechanical systems, component, or a process to meet desired needs within the realistic constraints such as environmental, social, political and economic sustainability.
5. An ability to use modern tools, software and equipment to analyze multidisciplinary problems.
6. An ability to demonstrate on professional and ethical responsibilities.
7. An ability to communicate, write reports and express research findings in a scientific community.
8. An ability to adapt quickly to the global changes and contemporary practices.
9. An ability to engage in life-long learning.

**PEO / PO Mapping**

<b>Programme Educational Objectives</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>
<b>I</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓
<b>II</b>	✓	✓	✓		✓			✓	
<b>III</b>		✓		✓	✓	✓		✓	
<b>IV</b>					✓	✓	✓		✓
<b>V</b>		✓	✓	✓	✓				✓

**ANNA UNIVERSITY, CHENNAI**  
**AFFILIATED INSTITUTIONS**  
**B.E. MECHANICAL ENGINEERING**  
**REGULATIONS - 2017**  
**CHOICE BASED CREDIT SYSTEM**  
**I TO VIII SEMESTERS CURRICULA AND SYLLABI**

**SEMESTER I**

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	HS8151	Communicative English	HS	4	4	0	0	4
2.	MA8151	Engineering Mathematics - I	BS	4	4	0	0	4
3.	PH8151	Engineering Physics	BS	3	3	0	0	3
4.	CY8151	Engineering Chemistry	BS	3	3	0	0	3
5.	GE8151	Problem Solving and Python Programming	ES	3	3	0	0	3
6.	GE8152	Engineering Graphics	ES	6	2	0	4	4
<b>PRACTICALS</b>								
7.	GE8161	Problem Solving and Python Programming Laboratory	ES	4	0	0	4	2
8.	BS8161	Physics and Chemistry Laboratory	BS	4	0	0	4	2
<b>TOTAL</b>				<b>31</b>	<b>19</b>	<b>0</b>	<b>12</b>	<b>25</b>

**SEMESTER II**

SL. NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>THEORY</b>								
1.	HS8251	Technical English	HS	4	4	0	0	4
2.	MA8251	Engineering Mathematics - II	BS	4	4	0	0	4
3.	PH8251	Materials Science	BS	3	3	0	0	3
4.	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	ES	3	3	0	0	3
5.	GE8291	Environmental Science and Engineering	HS	3	3	0	0	3
6.	GE8292	Engineering Mechanics	ES	5	3	2	0	4
<b>PRACTICALS</b>								
7.	GE8261	Engineering Practices Laboratory	ES	4	0	0	4	2
8.	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	ES	4	0	0	4	2
<b>TOTAL</b>				<b>30</b>	<b>20</b>	<b>2</b>	<b>8</b>	<b>25</b>

**OBJECTIVES:**

- To study the nature and facts about environment.
- To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- To study the interrelationship between living organism and environment.
- To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- To study the dynamic processes and understand the features of the earth's interior and surface.
- To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14**

Definition, scope and importance of environment – need for public awareness - concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, national and local levels – India as a mega-diversity nation – hot-spots of biodiversity – threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: In-situ and ex-situ conservation of biodiversity. Field study of common plants, insects, birds; Field study of simple ecosystems – pond, river, hill slopes, etc.

**UNIT II ENVIRONMENTAL POLLUTION 8**

Definition – causes, 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 hazards – solid waste management: causes, effects and control measures of municipal solid wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides. Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

**UNIT III NATURAL RESOURCES 10**

Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people – Water resources: Use and over- utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies – Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. case studies – Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resources for sustainable lifestyles. Field study of local area to document environmental assets – river / forest / grassland / hill / mountain.

#### **UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT**

**7**

From unsustainable to sustainable development – urban problems related to energy – water conservation, rain water harvesting, watershed management – resettlement and rehabilitation of people; its problems and concerns, case studies – role of non-governmental organization- environmental ethics: Issues and possible solutions – climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust, case studies. – wasteland reclamation – consumerism and waste products – environment production act – Air (Prevention and Control of Pollution) act – Water (Prevention and control of Pollution) act – Wildlife protection act – Forest conservation act – enforcement machinery involved in environmental legislation- central and state pollution control boards- Public awareness.

#### **UNIT V HUMAN POPULATION AND THE ENVIRONMENT**

**6**

Population growth, variation among nations – population explosion – family welfare programme – environment and human health – human rights – value education – HIV / AIDS – women and child welfare – role of information technology in environment and human health – Case studies.

**TOTAL: 45 PERIODS**

#### **OUTCOMES:**

- Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
- Public awareness of environmental is at infant stage.
- Ignorance and incomplete knowledge has lead to misconceptions
- Development and improvement in std. of living has lead to serious environmental disasters

#### **TEXTBOOKS:**

1. Benny Joseph, 'Environmental Science and Engineering', Tata McGraw-Hill, New Delhi, 2006.
2. Gilbert M.Masters, 'Introduction to Environmental Engineering and Science', 2<sup>nd</sup> edition, Pearson Education, 2004.

#### **REFERENCES :**

1. Dharmendra S. Sengar, 'Environmental law', Prentice hall of India PVT LTD, New Delhi, 2007.
2. Erach Bharucha, "Textbook of Environmental Studies", Universities Press(I) PVT, LTD, Hydrabad, 2015.
3. Rajagopalan, R, 'Environmental Studies-From Crisis to Cure', Oxford University Press, 2005.
4. G. Tyler Miller and Scott E. Spoolman, "Environmental Science", Cengage Learning India PVT, LTD, Delhi, 2014.

**GE8292**

**ENGINEERING MECHANICS**

**L T P C  
3 2 0 4**

#### **OBJECTIVES:**

- To develop capacity to predict the effect of force and motion in the course of carrying out the design functions of engineering.

#### **UNIT I STATICS OF PARTICLES**

**9+6**

Introduction – Units and Dimensions – Laws of Mechanics – Lami's theorem, Parallelogram and triangular Law of forces – Vectorial representation of forces – Vector operations of forces -additions, subtraction, dot product, cross product – Coplanar Forces – rectangular components – Equilibrium of a particle – Forces in space – Equilibrium of a particle in space – Equivalent systems of forces – Principle of transmissibility .