

PES College of Engineering, Aurangabad

Academic Year - 2023-2024 Deparment of Applied Science Subject - Engineerin Chemistry



Program Educational Objectives (PEOs)

Graduates will able to-

- Equip graduates with a strong foundation in engineering sciences & allied discipline fundamentals to become effective collaborators, researchers and real-time problem solver with technical competencies.
- Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.
- Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Program Specific Outcomes (PSOs)

- 1. Apply basic knowledge related to the discipline to solve engineering/societal problems.
- Recognize and adapt to technical developments and to engage in lifelong learning and develop consciousness for professional, social, legal and ethical responsibilities.
- 3. Excellent adaptability to the changing industrial and real world requirements

Course Objectives:

- 1. To know the demonstration of knowledge of Chemistry in technical fields.
- To bring adaptability to new developments in Engineering Chemistry and to acquire the skillsrequired to become a perfect engineer.
- 3. To understand and develop the importance of water in industrial and domestic usage.
- To identify the concepts of Chemistry to lay the ground work for subsequent studies in variousengineering fields.
- 5. To examine a fuel and suggest alternative fuels.

Alexander.



P.E.S. College Of Engineering, Aurangabad

Course Objective and Course Outcomes of Engineering Physics (BTBS102/202)

Subject Teacher: Dr. Surekha V. Munde

Course Objectives:

- 1. To provide a firm grounding in the basic physics principles and concept to resolve many Engineering and technological problems.
- 2. To understand and study the Physics principles behind the developments of engineering materials.

Course Outcomes:

Students will be able to:

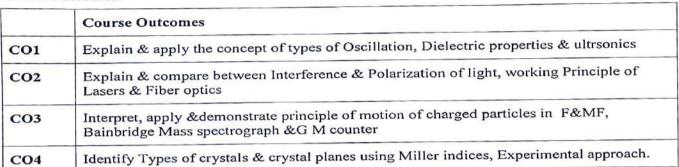
- CO1. Explain & apply the concept of types of Oscillation, Dielectric properties & ultrsonics
- CO2. Explain & compare between Interference & Polarisation of light, working Principle of Lasers & Fiber optics
- CO3. Interprete, apply &demonstrate principle of motion of charged particles in E & M field, Bainbridge Mass spectrograph & G M counter
- CO4. Identify Types of crystals & crystal planes using Miller indices, Experimental approach.

P.E.S. College Of Engineering, Aurangabad

COs, POs and PSOs of Engineering Physics (BTBS102/202)

Subject Teacher: Dr. Surekha V. Munde

Course Outcomes:



POs (Program Outcomes):

Are attributes of the engineering graduates of the engineering physics subject that are indicative of the engineering graduates, ability and competence to work as engineering professional upon graduation. Program Outcomes are statements that describe what students are expected to know or be able to do by the time of graduation. They must relate to knowledge and skills that the students acquire from the program. The achievement of all outcomes indicates that the student is well prepared to achieve the program educational objectives down the road. The following Pos have been chosen for the Physics subject.

PO1:	Apply the knowledge of physics to solve complex scientific and engineering problems using Scientific knowledge.
PO2:	Identify, formulate and analyze complex scientific and engineering problem for higher studies. (problem analysis)
PO3:	Engage in independent and lifelong learning in broadest contexts of science and technological development. (lifelong learning)
PO4:	Enhance and adopt new skills for future employability in technology and research through seminar, internship. (Future Employability).
PO5:	Successfully compete at national and international level competitive examinations. (Competency)
PO6:	Understand ethical principles and responsibilities of a physics graduate to serve the society. (Ethics)



PSO (Program Specific Outcomes):

Are Specific statements that describe the professional career accomplishments that the program is designed for. The PSOs of the Engineering physics in engineering disciplines are as follows:

DCO -	
PSO-1	Have fundamental and advanced level knowledge in field of optics, solid state physics, nuclear physics, acoustics, electronics and particle physics together with their applications in solving complex scientific problems in engineering disciplines.
PSO-2	Have fundamental and advanced level knowledge in field of applied physics particularly optical fiber communication, Dielectric, ultrasonics, crystal physics with their applications
PSO-3	Have fundamental and advanced level knowledge in field of applied physics with their applications in all engineering disciplines processing for advanced applications.

Mapping Of CO, PO and PSO

	PO1	PO2	PO3	PO4	PO5	l no s			
COI	V			1	103	PO6	PSO1	PSO2	PSO3
CO2		1		V		-	\checkmark	\checkmark	√
CO3			V						
04		1	<u> </u>		V		√	\checkmark	

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Program Educational Objectives (PEOs), Program Outcomes (POs), Program Specific Outcomes (PSOs), Course Objectives, Course Outcomes (Cos)

Department: Applied Science

Subject: BTBS101 ENGINEERING MATHEMATICS-I

Subject Teacher: Prof. S. R. Acharya

Program Educational Objectives (PEOs):

Graduates will able to-

- a. Equip graduates with a strong foundation in engineering sciences & allied discipline fundamentals to become effective collaborators, researchers and real-time problem solver with technical competencies
- b. Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.
- c. Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Program Outcomes (POs):

Engineering Graduate will be able to -

- 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 specific needs with appropriate consideration for the public health and safety, and the cultural, social, 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 modelling 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.
- 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 Outcomes (PSOs):

- 1. Apply basic knowledge related to the discipline to solve engineering/ societal problems.
- Recognize and adapt to technical developments and to engage in lifelong learning and develop consciousness for professional, social, legal and ethical responsibilities.

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3. Excellent adaptability to the changing industrial and real world requirements

Course Objectives:

- To know the application of the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
- To know and apply the concept partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions.
- To understand Computation of Jacobian of functions of several variables and their applications to engineering problems
- 4. To identify and sketch of curves in various coordinate system.
- 5. To evaluate multiple integrals and their applications to area and volume.

Course Outcomes:

Students will be able to:

- Apply the matrix technique (Linear algebra) to find solutions of system of linear equations arising in many engineering problem
- Demonstrate the concept partial derivatives and their applications to Maxima/ Minima, series expansion of multi valued functions.
- Compute Jacobian of functions of several variables and their applications to engineering problems
- Identify and sketch of curves in various coordinate system.
 Evaluate multiple integrals and their applications to area and volume.

Mapping of COs and POs

PO	1	2	3	4	5	6	7	8	9	10	11
CO ₁	3	1	2	3			2				3
CO2	2	2	2	2			2				2
CO3	3	1	3	2			1	2	1		3
CO4	2	2	1	3			3	3			2
CO5	2	3	2	1			2	2			2

Box. s.R. Phulpagos

P.E.S. COLLEGE OF ENGINEERING,

Nagsenvana, Chh. Sambhajinagar

SUBJECT: BTES206 Basic Civil and Mechanical Engineering

PROGRAM OUTCOME

PO1: Engineering Knowledge.

PO2: Environment and Sustainability

PO3: Life-long learning

COURSE OUTCOME

On completion of course, the students will be able to

CO1: Understand the scope and role of Civil Engineering in development of society.

CO2: Understand the importance of surveying and define of linear and angular measurement.

CO3: Understand the basic concept of building components and describe about the foundation.

Academic Year 2022-23

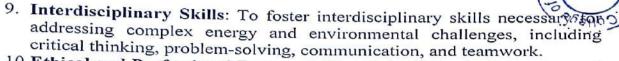
BTES105 Energy & Environment Engineering

Course Outcomes:



The course objectives of an Energy and Environmental Engineering program typically aim to provide students with a comprehensive understanding of the principles, technologies, and challenges associated with energy production, consumption, and environmental sustainability. Here are some common course objectives:

- Fundamental Understanding: To develop a solid understanding of the principles of thermodynamics, fluid mechanics, heat transfer, and other core engineering concepts relevant to energy systems and environmental engineering.
- 2. Energy Systems Analysis: To equip students with the analytical tools and methodologies necessary for analyzing energy systems, including energy production, distribution, and consumption patterns, and evaluating their environmental impacts.
- 3. Renewable Energy Technologies: To familiarize students with various renewable energy sources such as solar, wind, hydro, biomass, and geothermal energy, including their technologies, potential, and limitations.
- 4. Environmental Impact Assessment: To teach students how to assess the environmental impact of energy systems and technologies, including air and water pollution, greenhouse gas emissions, and ecosystem degradation.
- Pollution Control and Remediation: To provide students with knowledge of pollution control technologies and remediation strategies for mitigating the environmental impact of energy production and consumption activities.
- Energy Efficiency and Conservation: To explore strategies for improving energy efficiency and promoting energy conservation in various sectors, including industry, transportation, and buildings.
- Climate Change Mitigation: To educate students about the causes and impacts of climate change and to explore mitigation strategies, including renewable energy adoption, carbon capture and storage, and sustainable land use practices.
- 8. Policy and Regulation: To introduce students to the policy and regulatory frameworks governing energy and environmental issues at local, national, and international levels, and to explore the role of policy in promoting sustainable energy and environmental practices.



10. Ethical and Professional Responsibility: To instill in students a sense of ethical and professional responsibility towards promoting sustainability, protecting the environment, and contributing to the transition towards a more sustainable energy future.

These objectives are typically achieved through a combination of lectures, laboratory experiments, design projects, case studies, and practical experiences, allowing students to develop both theoretical knowledge and practical skills relevant to energy and environmental engineering practice.





Program outcomes for an Energy and Environmental Engineering degree outline the specific knowledge, skills, and abilities that students are expected to acquire by the time they complete the program. These outcomes serve as benchmarks for assessing the effectiveness of the curriculum and ensuring that graduates are prepared for successful careers in the field. Here are some typical program outcomes for such a degree:

- 1. Technical Knowledge: Graduates should demonstrate a deep understanding of the fundamental principles of energy engineering, environmental engineering, and the intersection of these fields, including thermodynamics, fluid mechanics, heat transfer, environmental chemistry, and sustainable energy technologies.
- Problem-Solving Skills: Graduates should be able to identify, formulate, and solve complex engineering problems related to energy production, consumption, and environmental sustainability, using analytical tools, computational methods, and experimental techniques.
- 3. **Design Abilities**: Graduates should be able to design energy systems and environmental solutions that meet specified requirements, taking into account technical, economic, environmental, and societal considerations, and applying principles of sustainable design and life cycle assessment.
- 4. Experimental Skills: Graduates should be proficient in conducting experiments, collecting and analyzing data, and interpreting results to validate theoretical models, evaluate system performance, and solve practical engineering problems in energy and environmental applications.
- 5. Interdisciplinary Integration: Graduates should be able to integrate knowledge and methods from multiple disciplines, including engineering, environmental science, economics, policy, and social sciences, to address complex energy and environmental challenges from a holistic perspective.
- 6. Communication Skills: Graduates should be able to communicate effectively with diverse stakeholders, including technical and non-technical audiences, through written reports, oral presentations, and graphical representations, conveying technical information, project proposals, and recommendations clearly and persuasively.
- 7. Teamwork and Leadership: Graduates should be able to work collaboratively in multidisciplinary teams, demonstrating effective teamwork, leadership, and interpersonal skills, and respecting diverse perspectives, to achieve common goals and solve real-world engineering problems.
- 8. Ethical and Professional Responsibility: Graduates should understand the ethical, social, and environmental responsibilities of the engineering

profession, including issues of sustainability, equity, diversity, safety, and public health, and demonstrate integrity, professionalism, and a commitment to ethical conduct in their professional practice.

9. Lifelong Learning and Professional Development: Graduates should recognize the importance of lifelong learning and professional development, staying abreast of advances in technology, regulations, and best practices in energy and environmental engineering, and actively engaging in continuing education, professional networking, and professional licensure or certification.

10.Global and Societal Impact: Graduates should be aware of the global and societal impact of energy systems and environmental engineering practices, including their role in addressing climate change, promoting sustainable development, and enhancing quality of life, and be prepared to contribute positively to society through their work as responsible and engaged citizens.

These program outcomes are typically assessed through a combination of coursework, exams, projects, presentations, laboratory work, internships, and capstone experiences, allowing students to demonstrate their achievement of the program's learning objectives and readiness for professional practice or further study in the field.

Teaching plan for Energy and Environment Engineering

Course Information

· Course Title: Energy and Environment Engineering

Course Code: [BTES105]

Credits: 2

• Semester: [2nd Semester]

Prerequisites: Basic knowledge of Environmental Science

Instructor Information

• Instructor Name: [Prof. K. B. Gawale / Prof. R. U. Magre]

Office Location: [PES College of Engg. Chh. Sambhajinagar]

• Office Hours: [7 Hrs]

• Email: [kishoregawale@gmail.com / ravimagare999@gmail.com]

Course Description

This course provides a comprehensive overview of energy systems and their environmental impacts. It covers the fundamental principles of energy conversion, various forms of energy, renewable energy technologies, energy efficiency, conservation methods, and the policies and regulations governing energy and environmental practices.

Course Objectives

- Understand the principles of energy conversion and the various forms of energy.
- 2. Analyse the environmental impacts of different energy sources.
- 3. Explore renewable energy technologies and their applications.

4. Study energy efficiency and conservation methods.

5. Examine policies and regulations related to energy and the environment.

Learning Outcomes

Upon successful completion of this course, students will be able to:

- 1. Explain the basic concepts of energy conversion and various forms of energy.
- 2. Evaluate the environmental impacts of fossil fuels and renewable energy sources.
- 3. Design and analyse renewable energy systems such as solar, wind, hydro, and biomass.

4. Implement energy efficiency and conservation strategies.

5. Understand and apply policies and regulations related to energy and the environment.

Weekly Lecture Plan

Week 1: Introduction to Energy and Environment

- Lecture 1: Overview of energy systems and the relationship between energy and the environment
- Lecture 2: Current global energy scenario and energy consumption patterns

Week 2: Basics of Energy Conversion

- Lecture 3: Thermodynamics and energy conversion principles
- · Lecture 4: Types of energy: mechanical, thermal, chemical, electrical

Week 3: Fossil Fuels and Their Environmental Impact

- · Lecture 5: Types of fossil fuels: coal, oil, natural gas
- · Lecture 6: Environmental impacts: greenhouse gases, pollution, acid rain

Week 4: Renewable Energy Sources - Solar Energy

- Lecture 7: Solar radiation and its characteristics, PV systems and solar thermal systems
- · Lecture 8: Applications and case studies of solar energy

Week 5: Renewable Energy Sources - Wind Energy

- · Lecture 9: Wind energy fundamentals, wind turbines, and their design
- · Lecture 10: Environmental impact of wind farms

Week 6: Renewable Energy Sources - Hydro and Biomass Energy

- · Lecture 11: Hydropower principles and types of hydroelectric plants
- · Lecture 12: Biomass energy and biofuels

Week 7: Environmental Impact of Biomass Energy and Energy Efficiency

- Lecture 13: Environmental impact of biomass energy, life cycle analysis of biofuels
- Lecture 14: Importance of energy efficiency, methods, and technologies for energy conservation

Week 8: Energy Auditing and Management

- Lecture 15: Energy auditing principles, tools, and techniques for energy management
- · Lecture 16: Conducting an energy audit and developing an energy conservation plan eering

Week 9: Environmental Impact Assessment (EIA)

- Lecture 17: Principles and process of EIA, EIA for energy projects
- Lecture 18: Mitigation strategies for environmental impacts

Week 10: Policy and Regulation

- · Lecture 19: National and international energy policies, comparative analysis
- · Lecture 20: Regulations and standards for environmental protection, role of government and NGOs

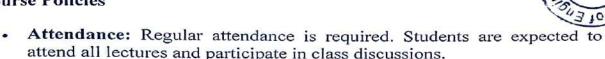
Assessment and Evaluation

- CA (20%)
 - Continuous assessment for subject covered
- MSE (20%)
 - Mid-Semester exam related to energy systems
- ESE (60%)
 - Comprehensive exam covering all course material

Textbooks and References

- Textbooks:
 - "Renewable Energy: Power for a Sustainable Future" by Godfrey
 - o "Energy and the Environment" by James A. Fay and Dan S. Golomb
- Journals and Articles:
 - "Renewable Energy" Journal
 - "Energy Policy" Journal
- Online Resources:
 - U.S. Department of Energy (DOE) website
 - International Energy Agency (IEA) website

Course Policies



• Late Assignments: Late assignments will be penalized 10% per day

unless prior arrangements have been made with the instructor.

· Academic Integrity: All students must adhere to the institution's academic integrity policy. Cheating, plagiarism, and other forms of academic dishonesty will not be tolerated.

Additional Resources

• Tutoring Services: [IIT NPTEL Lectures]

Library Resources: [College library]

This course file serves as a comprehensive guide for students enrolled in the Energy and Environment Engineering course, outlining the objectives, weekly topics, assessment methods, and resources available to support their learning.

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Program Educational Objectives (PEOs), Program Outcomes (POs), Program Specific Outcomes (PSOs), Course Objectives, Course Outcomes (Cos)

Department: Applied Science

Subject: BTBS201 ENGINEERING MATHEMATICS-II

Subject Teacher: Prof. S. R. Acharya

Program Educational Objectives (PEOs):

Graduates will able to-

- a. Equip graduates with a strong foundation in engineering sciences &allied discipline fundamentals to become effective collaborators, researchers and real-time problem solver with technical competencies
- b. Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.
- c. Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Program Outcomes (POs):

Engineering Graduate will be able to -

- 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 specific needs with appropriate consideration for the public health and safety, and the cultural, social, 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.

College

- 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 professionalengineering 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.
- 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 Outcomes (PSOs):

- 1. Apply basic knowledge related to the discipline to solve engineering/ societal problems.
- 2. Recognize and adapt to technical developments and to engage in lifelong learning and develop consciousness for professional, social, legal and ethical responsibilities.
- 3. Excellent adaptability to the changing industrial and real world requirements

Course Objectives:

- To know and discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions.
- 2. To understand and solve first and higher order differential equations and apply them as a mathematical modelling in electric and mechanical systems.
- 3. To determine Fourier series representation of periodic functions over different intervals.
- 4. To demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
- 5. To know and apply the principles of vector integration to transform line integral to surface integral, surface to volume integral &vice versa using Green's, Stoke's and Gauss divergence theorems

Course Outcomes:

Students will be able to:

- Discuss the need and use of complex variables to find roots, to separate complex quantities and to establish relation between circular and hyperbolic functions.
- Solve first and higher order differential equations and apply them as a mathematical modelling in electric and mechanical systems.
- 3. Determine Fourier series representation of periodic functions over different intervals.
- 4. Demonstrate the concept of vector differentiation and interpret the physical and geometrical meaning of gradient, divergence &curl in various engineering streams.
- 5. Apply the principles of vector integration to transform line integral to surface integral ,surface to volume integral &vice versa using Green's, Stoke's and Gauss divergence theorems

Mapping of COs and Pos

PO CO1	1	2	3	4	5	6	7	8	9	10	11
	2	1	3	2			2				2
CO ₂	3	2	1	3			3				3
CO ₃	3	2	2	3			1	2			3
CO3 CO4 CO5	2	3	2	2			2	3			2
CO5	2	3	2	2			2	2			2

CO-PO Mapping

Criteria - 2.6.1



Dr. Babasaheb Ambedkar Technological University, Lonere- 402103



P.E.S. College of Engineering, Aurangabad

Department of Computer Science and Engineering

Course Coordinator: Prof. S.A. Khusro Course Name: Discrete Mathematics

Course Code: BTCOC302 Academic Year: 2023-24

Semester V

Course:DMS
CourseCode:BTCOC302
Course Coordinator:

Course Coordinator: Prof. S.A.KHUSRO

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116

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110

110

100

Program Educational Objectives(PEO) and Program Specific Outcomes (PSO)

Year: 2023 - 2024

Semester III

Pro	ogram Educational Objectives (PEO)
1.	To provide knowledge of sound mathematical principles underlying various programming concepts.
2.	of information systems.
3.	To provide knowledge of mechanisms for building large-scale computer-based systems
4.	To develop an ability to provide computer-based solutions to the problems from other disciplines of
5.	To impart skills necessary for adapting rapid changes taking place in the field of information and
6.	To provide knowledge of ethical issues arising due to deployment of information and communication technologies in the society on large scale.

1.	Apply basic knowledge related to programming in a
	Apply basic knowledge related to programming, various software tools and algorithms to solve engineering/ societal problems in the field of Computer Science and Engineering. Provide exposure to latest tools and technologies and technologies and technologies and technologies and technologies.
2.	Provide exposure to latest tools and technologies and aware of the impact of professional engineering solution in environmental, societal, professional ethics and able to communicate
3.	To publish research paper and think, innovates in artificial intelligence, machine Learning and Data Science domain.

Course:DMS
CourseCode:BTCOC302
Course Coordinator: Prof.
S.A.KHUSRO

Program Outcomes (PO)

Year: 2023 - 2024 Semester: III

PROGRAM OUTCOMES: Upon successful completion of this course it is expected that computer science graduate will be able to:

rogra	m Outcome
	We was the matical structures, Logic and
PO1	The graduates will possess the knowledge of various discrete mathematical structures, Logic and
PUI	
	C Finite Automata and Probability
77	The graduates will have an ability to apply mathematical formalism of Finite Automata and Probability
PO2	in modeling and analysis of systems.
102	i Liame cuen as database of
PO3	The graduates will have knowledge of core programming paradigms such as orientation, and agent orientation and concepts essential to implement software based system.
POS	it is solutions to them and to
PO4	The graduates will have an ability to analyze problem, specify algorithmic solutions to them and to
104	evaluate alternative solutions.
PO5	The graduate will have broad understanding of the impact of a computer based solutions in economic
103	
	and distilling relevant information to provide computer based services
PO6	The graduates will demonstrate the ability to build human centric interfaces to computers.
100	
PO7	The graduates will possess the knowledge of advanced and emerging topics in the fields of operating
10,	existems, databases and computer networks.
PO8	The graduates will posses skills necessary to communicate design engineering ideas. The skills se
100	include verbal, written and listening skills.
PO9	The graduates will understand ethical issues in providing computer based solutions also they will have
10)	an ability and attitude to address the ethical issues
010	The graduates will understand the role of system software such as operating systems, databas
	nanagement systems, compilers, middle-ware and internet protocols in realizing distributed information
	environment



Course: DMS

CourseCode:BTCOC302

Course Coordinator: Prof. S.A.KHUSRO

Course Objective and Course Outcomes

Year : 2023 - 2024

Semester : III

Cou	rse Objective :
1.	Describe the basic concepts of sets, permutations, relations, graphs, trees and finite state machines.
2.	Analyze the basic structures of lattice and Boolean algebra.
3.	Differentiate between disjunctive normal form and conjunctive normal form.
4.	Apply the concepts of graphs to solve various problems in day to day life.

CO1	Analyze logical propositions via truth tables.
CO2	Prove mathematical theorems using mathematical induction. • Understand sets and perform operations and algebra on sets.
CO3	Determine properties of relations, identify equivalence and partial order relations, sketch relations.
CO4	Identify functions and determine their properties. Evaluate combinations and permutations on sets.



Course: DMS
CourseCode:BTCOC302
Course Coordinator:
Prof. S.A.KHUSRO

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Mapping of
1. Course Outcomes(CO) and
Program Outcomes(PO)
2. Course Outcomes(CO) and

Program Specific Outcomes(PSO)

Year: 2023 - 2024 Semester: III

1. Mapping of Course Outcomes (CO) and Program Outcomes(PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1		V		V				V		1010
CO2		~		V						V
CO3	V	~						v		
CO4		V		V					-	v

2. Mapping of Course Outcomes (CO) and Program Specific Outcomes(PSO)

1 10	PSO1	PSO2	PSO3
CO1	/		
CO2		V	
CO3	,	V	
CO4	/	V	



Course: DMS

CourseCode:BTCOC302

Course Coordinator: Prof. S.A.KHUSRO **Teaching Plan**

Year: 2023 - 2024

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Semester : III

Bloom Levels: 1. Remember 2. Understand 3. Apply 4. Analysis 5. Create

Lect No.	Outcome No		Course Outcome No. and Bloom Level	Refer (Text Book, Website)
1	05/09/2022	Basics of sets and vein diagram		Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankane
2	06/09/2022	Study of Cartesian product, Examples on power set		Discrete Mathematics by K. Sharma 4th Edition
3	09/09/2022	Cardinality and count ability, Examples on count ability		https://www.geeksforgeeks.org/determ ning-countability-in-toc/
4	12/09/2022	Propositional logic, Example on propositional logic,		https://www.javatpoint.com/propositic
5	13/09/2022	Logical connectives, negation, conjunction, disjunction, conditional	Understand, Apply	https://math.libretexts.org/Courses/La: Positas College/Math for Liberal A rts/03%3A Logic/3.02%3A Truth Ta bles- Conjunction (and) Disjunction (or) Negation (not)
6	16/09/2022	Truth tables, normal form, conjunctive and disjunctive NF,Eamples	Understand, Apply	Discrete Mathematics by K. Sharma 4th Edition
7	19/09/202	on predicate	Understand, Apply	Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankane
8	20/09/2022	quantities	Understand, Apply	Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankane
9	23/09/2022	medicin of artimetic	Understand, Appl	Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankana
10		First order logic, Mathematical induction	Understand As-	Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankane
11	27/09/2022	Examples in induction and quantifier, Greatest common devisor	Remember	Nirali prakashan, Text book, By Dr Latha k. Iyer, Dr. Neeta D. Kankan
12	30/09/2022	Well ordering principal, recursive definition, division algorithm, prime numbers		https://www.youtube.com/watch?v

Date

- 2	03/10/20	22 6			
13	03/10/20	22 (Overview of function, Types of		
'		f	unction		https://www.geeksforgeeks.org/tyj
		- 1			of-functions/
		T	avon-1	Remember, App	alv
14	04/10/20	22 1	Examples on injective, subjective an oijective functions	d	
		22	Dijective functions		https://www.geeksforgeeks.org/typ
				D	OI-Tunctions/
	CARROLINA MARIN BARANINA		inverse and composition of function	Remember, App	ly
	07/10/2)22	and composition of function		https://math.libretexts.org/Courses/N
15					nroe Community College/MTH 22
					Discrete Math/5%3A Functions/5.5
				Understand,	3A Inverse Functions and Compo-
	10/10/2	022	Example on composition of function	Remember	on
100 m			Example of composition of function		https://math.libretexts.org/Courses/M
16	1				nroe Community College/MTH 22
	1				Discrete Math/5%3A Functions/5.5
	AT MESTERS		1	lladasst	3A Inverse Functions and Compos
			Reflexivity, Symmetry, transitivity	Understand, Apply	
17	11/10/	2022	and equivalence		Nirali prakashan, Text book, By Dr.
			- Squirmence	promotion to secure of	Latha k. Iyer, Dr. Neeta D. Kankane
	14/10/	2022	Evamples on G '-	Understand, Apply	
18	3	-022	Examples on reflexivity, symmetry,		Nirali prakashan, Text book, By Dr.
0			transitivity and equivalence relation		Latha k. Iyer, Dr. Neeta D. Kankane
			Combine	Understand	
1 19	17/10	2022	Combinatorics, counting and recurrence relation	565 200	https://www.youtube.com/watch?v=J5
	1.77.10	-022	recurrence relation	Understand,	nVX2Sk4cE
-	19/10	/2022	Compani	Create	THE STATE OF THE S
1 2	0 18/10	2022	Generating functions, examples on		Nirali prakashan, Text book, By Dr.
1 -			combinatories	Understand,	Latha k. Iyer, Dr. Neeta D. Kankane
			What is graph basis to	Create	
2	1 21/10	/2023	What is graph, basic terminology of		https://www.javatpoint.com/graph-
			graph, simple and multigraph	No.	theory-types-of-graphs
	25/10	/2021	Multigraph and weighted graph,	Understand	51317113
2	22	-044	finite and infinite graph		https://www.javatpoint.com/graph-
10	oud?		mine and minine graph		theory-types-of-graphs
			Path simple and alaman	Kemember	
1	23 28/10	/2023	Path, simple and elementary path, circuits, Shortest path problem,		Nirali prakashan, Text book, By Dr.
			proof, examples	1	Latha k. Iyer, Dr. Neeta D. Kankane,
			proof, examples		
	31/10	2022	Euler and Hamiltonian path, practice	Remember	
2	4		examples on	1	https://www.geeksforgeeks.org/mathe
			Pamilynes on	12237 321	natics-culer-hamiltonian nather
				anderstand,	https://www.voutube.com/watch?h-A
			Practice example on Euler's and		83811E1/9WI
2	5 01/11/	2022	Hamiltonian paths and circuits	£	Nirali prakashan, Text book, By Dr.
				r	atha k. Iyer, Dr. Neeta D. Kankane
	04/11/	2022	Representation of graph, graph	Understand	
20	6		coloring	E	Nirali prakashan, Text book, By Dr.
	10000			4	atha k. Iyer, Dr. Neeta D. Kankane
		-	Chromatic polynomial, colouring of	Understand	
27	07/11/2	022	planer graph, matching		ttps://www.javatpoint.com/chromatic
			No. of the second secon	E2	olynomial-in-discrete mathematics
			F	temember, Apply	13/ 15/

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28	11/11/2022	Matchine		
29		Coloring and matching of graph Trees, rooted trees, path length in rooted trees, binary search tree, examples	Remember	https://www.youtube.com/watch?v=8] https://study.com/learn/lesson/trees- discrete-math-overview-types-
30	15/11/2022	spanning tree and cut set, examples on binary and spanning tree	Understand, Create	discrete-math-overview-types examples.html#:~:text=What%20is%. 0a%20rooted%20tree,root%20either% 20directly%20or%20indirectly. Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankane,
31	STORY.	minimal spanning trees,Kruskals and prims algorithm for minimal spanning tree, examples,	Create	Discrete Mathematics by K. Sharma 4th Edition
32	21/11/2022	Algebraic structure with one binary operation, semi groups, monoid groups,	Remember Understand, Apply,	Nirali prakashan, Text book, By Dr. Latha k. Iyer, Dr. Neeta D. Kankane.
33	22/11/2022	Congruent relation and quotient structure, free and cyclic monoids and groups		700 F350
34	25/11/2022	Permutation groups, substructures, normal subgroups, algebraic structure, rings	Understand, Create	Discrete Mathematics by K. Sharma
35	28/11/2022	Integral domain and fields, Boolean algebra and Boolean rings, examples	Understand	Discrete Mathematics by K. Sharma 4 th Edition

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Dr. Babasaheb Ambedkar Technological University, Lonere- 402103



P.E.S. College of Engineering, Aurangabad

Department of Computer Science and Engineering

Course Coordinator: Prof. S.A.KHUSRO

Course Name : Artificial Intelligence

Course Code: BTCOC701 Academic Year: 2023-24

Semester VII

Course: AI

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CourseCode: BTCOC701

Course Coordinator: Prof. S.A. KHUSRO Program Educational Objectives(PEO) and Program Specific Outcomes (PSO)

Year: 2023 - 2024

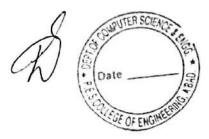
Semester VII

1.	To provide knowledge of sound mathematical principles underlying various programming concepts.
2.	To develop an ability to understand complex issues in the analysis, design, implementation and operation of information systems.
3.	To provide knowledge of mechanisms for building large-scale computer-based systems.
4.	To develop an ability to provide computer-based solutions to the problems from other disciplines o science and engineering.
5.	To impart skills necessary for adapting rapid changes taking place in the field of information and communication technologies.
6.	To provide knowledge of ethical issues arising due to deployment of information and communication technologies in the society on large scale.



	ram Specific Outcomes (PSO)
1.	Apply basic knowledge to the second s
2.	
	Provide exposure to latest tools and technologies and aware of the impact of professional engineering solution in environmental, societal, professional ethics and able to communicate effectively.
3.	To publish research paper and think, innovates in artificial intelligence, machine Learning Data Science domain.

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Course: AI

C

CourseCode:BTCOC701

Course Coordinator: Prof. S.A. KHUSRO Program Outcomes (PO)

Year: 2023 - 2024

Semester : VII

PROGRAM OUTCOMES: Upon successful completion of this course it is expected that computer science graduate will be able to:

rogra	n Outcome
PO1	The graduates will possess the knowledge of various discrete mathematical structures, Logic and numerical techniques.
PO2	The graduates will have an ability to apply mathematical formalism of Finite Automata and Probability in modeling and analysis of systems.
PO3	The graduates will have knowledge of core programming paradigms such as database orientation object orientation, and agent orientation and concepts essential to implement software based system.
PO4	The graduates will have an ability to analyze problem, specify algorithmic solutions to them and t evaluate alternative solutions.
PO5	The graduate will have broad understanding of the impact of a computer based solutions in economic environmental and social context and will demonstrate use of analytical tools in gathering requirements and distilling relevant information to provide computer based solutions.
PO6	The graduates will demonstrate the ability to build human centric interfaces to computers.
PO7	The graduates will possess the knowledge of advanced and emerging topics in the fields of operating systems, databases and computer networks.
PO8	The graduates will posses skills necessary to communicate design engineering ideas. The skills seinclude verbal, written and listening skills.
PO9	The graduates will understand ethical issues in providing computer based solutions also they will have an ability and attitude to address the ethical issues
PO10	The graduates will understand the role of system software such as operating systems, database management systems, compilers, middle-ware and internet protocols in realizing distributed information environment



Course: AI

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CourseCode:BTCOC701

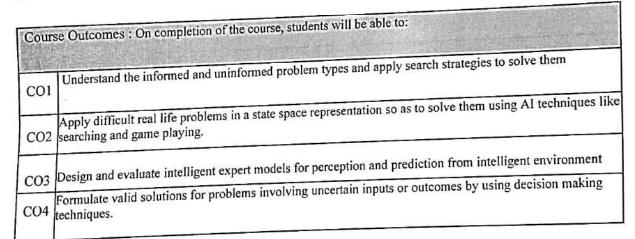
Course Coordinator: Prof. S.A.KHUSRO

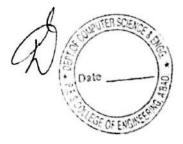
Course Objective and Course Outcomes

Year: 2023 - 2024

Semester : VII

Cou	rse Objective :
1.	Study the concepts of Artificial Intelligence.
2.	Learn the methods of solving problems using Artificial Intelligence.
3.	Learn the knowledge representation techniques, reasoning techniques and planning
4.	Introduce the concepts of Expert Systems and machine learning.





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Course: AI CourseCode:BTCOC701 Course Coordinator: Prof. S.A. KHUSRO

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Mapping of 1. Course Outcomes(CO) and Program Outcomes(PO)

45 (80) (30) (30) (30) (30)

2. Course Outcomes(CO) and Program Specific Outcomes(PSO) Year: 2023 - 2024

Semester : VII

1. Mapping of Course Outcomes (CO) and Program Outcomes(PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PC
CO1		~		~						v
CO2		~		~						_
CO3	V	~								v
	-	V		V						

2. Mapping of Course Outcomes (CO) and Program Specific Outcomes(PSO)

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V



Course: AI
CourseCode:BTCOC701
Course Coordinator:
Prof. S.A.KHUSRO

Teaching Plan

Year: 2023 - 2024 Semester: VII

Bloom Levels: 1. Remember 2. Understand 3. Apply 4. Analysis 5. Create

Lect No.	Date	Topic / Sub - Topic	Course Outcome No. and Bloom Level	Refer (Text Book, Website)		
	05/09/2022	What is AI, The foundation of Artificial Intelligence, The history of AI	Understand,	https://www.vssut.ac.in/lecture_n otes/lecture1428643004.pdf		
2	06/09/2022	State of art, What is Agent, Types of Agent, The intelligent agents	Remember Analysis	https://examupdates.in/artificial- intelligence-pdf/		
3	09/09/2022	Difference between human agent and intelligent agent, Environment and agents	Understand	https://www.tutorialspoint.com/ar tificial_intelligence/artificial_inte lligence_agents_and_environmen ts.htm#:~:text=A%20human%20 agent%20has%20sensory,motors %20and%20actuators%20for%20 effectors.		
	2/09/2022	What is rationality, Rational agents, PEAS properties, the nature of good environment	Understand	https://www.javatpoint.com/agen ts-in-ai https://www.geeksforgeeks.org/a		
1	3/09/2022	The structure of agent, Agent program, Properties	Understand, Apply	gents-artificial-intelligence/ https://www.ques10.com/p/4799		
1	6/09/2022	Example and properties of task environment	Understand, Apply	/properties-of-task-environments Artificial Intelligence, Nirali		
1	9/09/2022	Solving problem by searching, problem solving agent, explanation	Understand, Apply	Prakashan DBATU, Mrs. Ashwini C Bokhare Artificial Intelligence, Nirali		
	0/09/2022	Example problem, searching for solution, Informed and uninformed environment	Understand, Apply	Prakashan DBATU, Mrs. Ashwini C Bokhare https://www.geeksforgeeks.org/		
2	3/09/2022	Uninformed search strategies,DFS, BFS, Heuristic function, program	Understand, Apply	fference-between-informed-and uninformed-search-in-ai/ Artificial Intelligence, Nirali		
) 2	6/09/2022	Defining constraint satisfaction problem, constraints propagation: Inference in CSPs	Understand, Apply	Prakashan		
1 2	27/09/2022	Backtracking search for CSPs, the structure of problems, Adversarial search	Remember	Prakashan Bakhare		

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12	_			
12	30/09/2	022		
12				1/watch
13	03/10/20	Games, Optimal decision in games.	Understand, Analysis	https://www.youtube.com/watch v=dbbsNWw87co
14	04/10/20	Alpha-Beta pruning	Remember, Apply	Artificial Intelligence, Nirali Prakashan DBATU, Mrs. Ashwini C Bokhare
15	07/10/20	Knowledge representation issues, and mapping, Approaches to knowledge repress.	Remember, Apply	Artificial Intelligence, Nirali Prakashan DBATU, Mrs. Ashwini C Bokhare
ela"	+	Issues in KR. Using predicate logic: Representing simple fact in logic.	Understand, Remember	https://www.scaler.com/topics/pedicate-logic-in-ai/
16 17	11/10/203	relationship, Computable functions and predicates, Resolution, natural	Understand, Apply	https://www.javatpoint.com/pre- cate-logic
18	14/10/2023	Representing knowledge using rules: procedural versus declarative knowledge, logic programming	Understand	Artificial Intelligence, Nirali Prakashan DBATU, Mrs. Ashwini C Bokhare
	17/10/2022	Forward versus backward reasoning, matching, control knowledge	Understand, Create	Artificial Intelligence. I.M.Talwar, Dhanpat Publication
19	18/10/2022	Representing knowledge in an uncertain domain	Understand, Create	Artificial Intelligence, Deepak Khermani, Mn Graw Hill Publication
0	21/10/2022	The semantics of Bayesian network	Understand	Artificial Intelligence, Deepak Khermani, Mn Graw Hill Publication
1 537	25/10/2022	Demster-shafor theory	Remember	Artificial Intelligence, Deepak Khermani, Mn Graw Hill Publication
2	28/10/2022	Fuzzy sets and fuzzy logics	Remember	Artificial Intelligence. I.M.Talwar, Dhanpat Publication
	31/10/2022	Planning: Overview, Components of a planning system	Understand, Create	Artificial Intelligence. I.M.Talwar, Dhanpat Publication
C	01/11/2022	Goal stack planning, hierarchical planning	Understand	Artificial Intelligence, Nirali Prakashan DBATU, Mrs. Ashwini C Bokhare
		Other approaches to uncertain reasoning	Understand	Artificial Intelligence, Nirali Prakashan DBATU, Mrs. Ashwini C Bokhare
		Relational and first order probability models	Remember, Apply	Artificial Intelligence, Nirali Prakashan DBATU, Mrs. Ashwini C Bokhare
1		Examples on fuzzy logic and fuzzy sets	Remember	Artificial Intelligence. I.M.Talwar Dhanpat Publicati

Date _

Course:TOC CourseCode:BTCOC502 Course Coordinator: Prof. K.R.Ghule

Course Objective and Course Outcomes

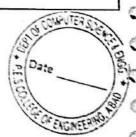
Semester: V

Co	urse Objective :
1.	To give an overview of the theoretical foundation of computer science from the perspective of formal languages.
2.	To illustrate finite state machines to solve problems in computing.
3.	To explain the hierarchy of problems arising in the computer science.
4.	To familiarize Regular Grammars, context fee grammar.



Cour	se Outcomes: On completion of the course, students will be able to:
CO1	Design Finite State Machine, regular expressions and grammars for given languages.
CO2	Understand formal machines, language and computations.
CO3	Develop analytical thinking and intuition for problem solving situations in related areas of theory of computation.
CO4	Solve various problems of applying normal form techniques, push down automata and turing machine.





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Course:TOC CourseCode:BTCOC502 Course Coordinator: Prof. K.R.Ghule

Mapping of
1. Course Outcomes(CO) and
Program Outcomes(PO)

2. Course Outcomes(CO) and Program Specific Outcomes(PSO) Year : 2023 - 2024 Semester : V

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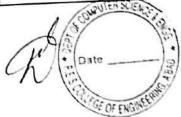
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1. Mapping of Course Outcomes (CO) and Program Outcomes(PO)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	РО
CO1		v		V				V		_
CO2		V		V						-
CO3	~	V								-
CO4		~		~						/1

2. Mapping of Course Outcomes (CO) and Program Specific Outcomes(PSO)

0			PSO3	
	PSO1	PSO2	PS03	
201	~			
202		<i>V</i>	.,	
203	·	<i>y</i>		
CO4	~	~	Cur	





Dr. Babasaheb Ambedkar Technological University, Lonere-402103



P.E.S.College of Engineering, Aurangabad

Department of Electronics Engineering (VLSI Design and Technology)

2.6.1 Program outcomes, program specific outcomes and course outcomes for all programs offered by the Institution are stated and displayed on website and communicated to teachers and students

PEO and PSO of Departments

Program Educational Objectives (PEOs)

PEO1 Graduates will be able to apply the fundamental concepts of Electronics Engineering for Electronic system design.

PEO2 Graduates will pursue career in VLSI design and allied fields on cutting edge technologies.

PEO3 Graduates will exhibit professional ethics and teamwork in their profession through lifelong learning.

Program Specific Outcomes (PSOs)

PSO1 Apply knowledge of Mathematics and Science to solve advanced Engineering problems in the areas of Micro-electronic devices & circuits, Signal Processing and computation to pursue higher studies.

PSO2 Accomplish advanced practical exposure in the domain of Electronics, IoT and VLSI using contemporary tools and/or equipment's to acquire professional competencies to meet industry standards.

Programme Outcomes (PO)

- **PO1** Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **PO2** 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.
- **PO3** 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.
- **PO4** 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.
- **PO5** 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.
- **PO6** 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.
- **PO7** 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.
- **PO8** Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **PO9** Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **PO10** 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.
- **PO11** 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.

PO12 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.