THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, mechanical engineering fundamentals and specialization for research and innovation and engineering problem solving.

PO2. Problem Analysis: Use the basic principles of science, mathematics and engineering for identifying and analyzing the mechanical engineering problems and to meet the desired needs.

PO3. Design/Development of Solutions: Design the system and simulation to find suitable solutions to mechanical engineering problems and needs.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Use the appropriate techniques, modern engineering tools and skills including modelling and simulation to bring the technology transfer with an understanding of the limitations.

PO6. The Engineer and Society: Apply scientific reasoning methodologies appropriate to mechnical engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and the responsibilities alongwith the norms of mechanical engineering practice.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community, be able to comprehend, write effective reports and design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment by using modern engineering tools with the skill of handling monetary resources.

PO12. Life-long Learning: Recognize the need for life-long learning to keep pace with technological and professional advancement.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to apply the acquired mechanical engineering knowledge for the benefit and improvement of self and the society.

PSO2. Engineering Graduates will be able to implement the learnt principles and skills to analyze, evaluate and create more advanced mechanical systems or processes.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF INFORMATION TECHNOLOGY

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving information technolgy engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the information technolgy engineering problems to reach the suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for information technolgy engineering problems and to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, modern resources to create IT tools including modeling and prediction for information technolgy engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to information technolgy engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts to converse suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and the responsibilities and the norms of informtion technology engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in information technolgy engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with exchange of clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.

PO12. Life-long Learning: Recognize the need for long-life learning and possess the ability to engage in the broadest context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to demonstrate database, networking and programming technologies with realistic constraints.

PSO2. Engineering Graduates will be able to design logical algorithms to meet the global needs and problems.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF APPLIED SCIENCE & HUMANITIES

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the basic knowledge of science, mathematics and engineering fundamentals for research, innovation and solving composite engineering problems.

PO2. Problem Analysis: Use the basic principles of natural sciences, mathematics and basic engineering for identifying and analyzing composite engineering problems.

PO3. Design/Development of Solutions: Design solutions for composite engineering problems and meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, modern engineering resources and IT tools for composite engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to composite engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the effect of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and bear the responsibilities and norms of composite engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in composite engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources.

PO12. Life-long Learning: Recognize the need for life-long learning in the broadest context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to apply the basic knowledge of science and mathematics to solve and analysis composite engineering problems.

PSO2. Engineering Graduates will be able to handle the societal problems and communicate effectively with ethical principles and professional ethics.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving electrical engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering specialization for identifying and analyzing the electrical engineering problems to reach suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for electrical engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, modern resources including modeling and prediction for simulation and commissioning the complete system of electrical engineering activities.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to electrical engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the effect of professional engineering solutions in societal and environmental contexts to convert suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and the responsibilities and the norms of electrical engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary activities.

PO10. Communication: Communicate effectively with engineering community in electrical engineering activities, be able to comprehend and write effective reports, design documentations and make effective presentation with exchange of clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources of one's own work.

PO12. Life-long Learning: Recognize the need for life-long learning to engage local and global current trend changing environment.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to design, formulate and investigate various problems of electric and electronic circuits, power electronics and power systems.

PSO2. Engineering Graduates will be able to apply modern software tools for design, simulation and analysis of communication system.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving computer engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering specialization for for identifying and analyzing the computer engineering problems to arrive valid conclusions.

PO3. Design/Development of Solutions: Design solutions for computer engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, resources, modern engineering including modeling and prediction to design computer applications for computer engineering activities with understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to computer engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of computer engineering solutions in societal and environmental contexts and demonstrate the knowledge for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the computer engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in computer engineering activities, be able to comprehend and write effective reports, design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage multidisciplinary environment with the skill of handling monetary resources in computer engineering projects.

PO12. Life-long Learning: Recognize the need for engaging in life-long learning in the context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to apply the knowledge of mathematics, basic science and basic computing in general and in identifying, formulating and solving the real life computer engineering problems.

PSO2. Engineering Graduates will be able to accelerate innovation for industrial and social needs.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving civil engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the civil engineering problems to reach suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for civil engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, resources, modern engineering technology including modeling and prediction for civil engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to civil engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the civil engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in civil engineering activities, be able to comprehend and write effective reports, design documentations to make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.

PO12. Life-long Learning: Recognize the need for life-long learning in the broadest context of globally changing and challenging environment.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to utilize the principles, methods and code of practice to excel in the area of drawing, designing and analysis related to civil engineering system.

PSO2. Engineering Graduates will be able to provide sustainable solution to civil engineering problems.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving automobile engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the automobile engineering problems to reach the suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for automobile engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, resources, modern engineering including modelling and prediction for automobile engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to automobile engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the cause of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the automobile engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in automobile engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.

PO12. Life-long Learning: Recognize the need for life-long learning in the broadest context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to utilize the principles of designing, machine manufacturing and thermal engineering to meet the automobile engineering requirements.

PSO2. Engineering Graduates will be able to provide sustainable solution to automobile engineering problems.

THEEM COLLEGE OF ENGINEERING

COMPUTER SCIENCE & ENGINEERING (AI&ML)

Program Outcomes PO

Engineering Graduates will be able to:

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.

Program Specific Outcomes PO

PSO1. Engineering graduates will be able to use principles and concepts of Artificial Intelligence and Machine Learning for problem definition, analysis and design of systems.

PSO2. Engineering graduates will be able to use appropriate software tools and techniques to develop computer programs in the areas of machine learning, artificial intelligence, deep learning, web computing, data analytics and visualization.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF APPLIED SCIENCE & HUMANITIES

Vision

"To become an excellent centre to inculcate solid foundation of engineering education and to promote practical aspects of applied science and humanities."

Mission

» To motivate students and teachers to show enthusiasm in learning fundamental aspects of science and humanities

» To counsel students to strengthen them in academics, ethics and social awareness

» To commit to teach students to think logically, question critically, communicate effectively and live ethically

Program Educational Objectives

PEO1. To build a solid foundation of mathematics and basic sciences.

PEO2. To encourage students to pursue career in science and engineering and communicate fluently to express their thoughts.

PEO3. To inculcate ethical principles in students for working in teams and serve the society.

PEO4. To provide basic engineering knowledge and concept of programming.

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THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF APPLIED SCIENCE & HUMANITIES

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the basic knowledge of science, mathematics and engineering fundamentals for research, innovation and solving composite engineering problems.

PO2. Problem Analysis: Use the basic principles of natural sciences, mathematics and basic engineering for identifying and analyzing composite engineering problems.

PO3. Design/Development of Solutions: Design solutions for composite engineering problems and meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, modern engineering resources and IT tools for composite engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to composite engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the effect of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and bear the responsibilities and norms of composite engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in composite engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources.

PO12. Life-long Learning: Recognize the need for life-long learning in the broadest context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to apply the basic knowledge of science and mathematics to solve and analysis composite engineering problems.

PSO2. Engineering Graduates will be able to handle the societal problems and communicate effectively with ethical principles and professional ethics.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGINEERING

Vision

"Providing high quality technical and professional education to empower the automobile engineers for contributing to global demand."

Mission

» To inculcate the recent technological trends in learning and research activities

» To offer opportunities for undertaking collaborative projects with automotive industry as a long-term learning

» To impart the knowledge of state-of-art designing and simulation of vehicle with better safety and less pollution

Program Educational Objectives

PEO1. To acquire fundamental technical knowledge and develop essential proficiency in varied areas of basic science, mathematics and engineering science.

PEO2. To inculcate core automobile areas such as vibration, thermal engineering, design of automotive system and autotronics to meet the automobile industry challenges.

PEO3. To enhance competency in interdisciplinary approach and research activities.

PEO4. To inculcate teamwork, leadership skills, problem solving and decision making skills and entrepreneurship.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF AUTOMOBILE ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving automobile engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the automobile engineering problems to reach the suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for automobile engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, resources, modern engineering including modelling and prediction for automobile engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to automobile engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the cause of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the automobile engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in automobile engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.

PO12. Life-long Learning: Recognize the need for life-long learning in the broadest context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to utilize the principles of designing, machine manufacturing and thermal engineering to meet the automobile engineering requirements.

PSO2. Engineering Graduates will be able to provide sustainable solution to automobile engineering problems.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Vision

"To be an excellence centre in the field of imparting mechanical engineering education, training and empowering technical skills and to adapt research and transformation culture."

Mission

» To educate students the mechanical engineering knowledge for life-long learning and empower their professional skillls to meet the career challenges

» To commit for professionalism, initiative, integrity, innovation and willingness to change and adopt research culture

» To facilitate project-based learning for research, innovation and transfer of technology to serve the society

Program Educational Objectives

PEO1. To acquire basic principles and knowledge of science and mathematics and its application through engineering skills.

PEO2. To achieve peer recognition as an individual and able to lead a team through engineering skill demonstration.

PEO3. To develop abilities for successful professional career with ethical and moral values.

PEO4. A competency to pursue life-long learning and to deal with challenges.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. **Engineering Knowledge:** Apply the knowledge of science, mathematics, mechanical engineering fundamentals and specialization for research and innovation and engineering problem solving.

PO2. **Problem Analysis:** Use the basic principles of science, mathematics and engineering for identifying and analyzing the mechanical engineering problems and to meet the desired needs.

PO3. **Design/Development of Solutions:** Design the system and simulation to find suitable solutions to mechanical engineering problems and needs.

PO4. **Conduct Investigations of Complex Problems:** Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. **Modern Tool Usage:** Use the appropriate techniques, modern engineering tools and skills including modelling and simulation to bring the technology transfer with an understanding of the limitations.

PO6. **The Engineer and Society:** Apply scientific reasoning methodologies appropriate to mechnical engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. **Environment and Sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. **Ethics:** Apply ethical principles, commit to professional ethics and the responsibilities alongwith the norms of mechanical engineering practice.

PO9. **Individual and Teamwork:** Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. **Communication:** Communicate effectively with engineering community, be able to comprehend, write effective reports and design documentations and make effective presentation with clear instructions.

PO11. **Project Management and Finance:** Manage projects in multidisciplinary environment by using modern engineering tools with the skill of handling monetary resources.

PO12. **Life-long Learning:** Recognize the need for life-long learning to keep pace with technological and professional advancement.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to apply the acquired mechanical engineering knowledge for the benefit and improvement of self and the society.

PSO2. Engineering Graduates will be able to implement the learnt principles and skills to analyze, evaluate and create more advanced mechanical systems or processes.

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THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL ENGINEERING

Vision

"To become a center of excellence in the field of electrical engineering to produce competent engineering graduates to serve the nation."

Mission

» To provide an atmosphere to the staff and students for continuous learning, applying, investigating and transfer of knowledge

» To promote student centered teaching-learning environment for developing professional technocrats with ethical values

» To provide suitable forums for enhancing research and creativity

Program Educational Objectives

PEO1. To acquire a strong background in basic science and mathematics and ability to use electrical engineering tools.

PEO2. To enable effective knowledge of electrical engineering in students to solve complex engineering problems.

PEO3. To produce graduates communicating effectively with colleagues, clients, employers and society with professional outlook.

PEO4. To attain professional excellence through life-long learning.

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THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving electrical engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering specialization for identifying and analyzing the electrical engineering problems to reach suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for electrical engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, modern resources including modeling and prediction for simulation and commissioning the complete system of electrical engineering activities.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to electrical engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the effect of professional engineering solutions in societal and environmental contexts to convert suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and the responsibilities and the norms of electrical engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary activities.

PO10. Communication: Communicate effectively with engineering community in electrical engineering activities, be able to comprehend and write effective reports, design documentations and make effective presentation with exchange of clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources of one's own work.

PO12. Life-long Learning: Recognize the need for life-long learning to engage local and global current trend changing environment.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to design, formulate and investigate various problems of electric and electronic circuits, power electronics and power systems.

PSO2. Engineering Graduates will be able to apply modern software tools for design, simulation and analysis of communication system.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF INFORMATION TECHNOLOGY

Vision

"To become a center of excellence in information technology discipline and to create technically capable and intellectual IT professionals."

Mission

» To nurture an effective teaching-learning process to provide in-depth knowledge of principles and its applications pertaining to information technology

» To provide an environment to students and faculty for continuous-learning to apply and explore the knowledge to meet global challenges

» To inculcate creative thinking through industry sponsored projects and innovative exercises to become employable

Program Educational Objectives

PEO1. To provide wide knowledge of mathematics, science, basic computing engineering to pursue advanced study for research.

PEO2. To impart core professional skills with latest technologies for immediate employment.

PEO3. To prepare students to identify, formulate and solve IT problems.

PEO4. To inculcate ethical values, interpersonal skills, leadership qualities to become successful in professional career.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF INFORMATION TECHNOLOGY

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving information technolgy engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the information technolgy engineering problems to reach the suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for information technolgy engineering problems and to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, modern resources to create IT tools including modeling and prediction for information technolgy engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to information technolgy engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts to converse suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and the responsibilities and the norms of informtion technology engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in information technolgy engineering activities, be able to comprehend, write effective reports, design documentations and make effective presentation with exchange of clear instructions.

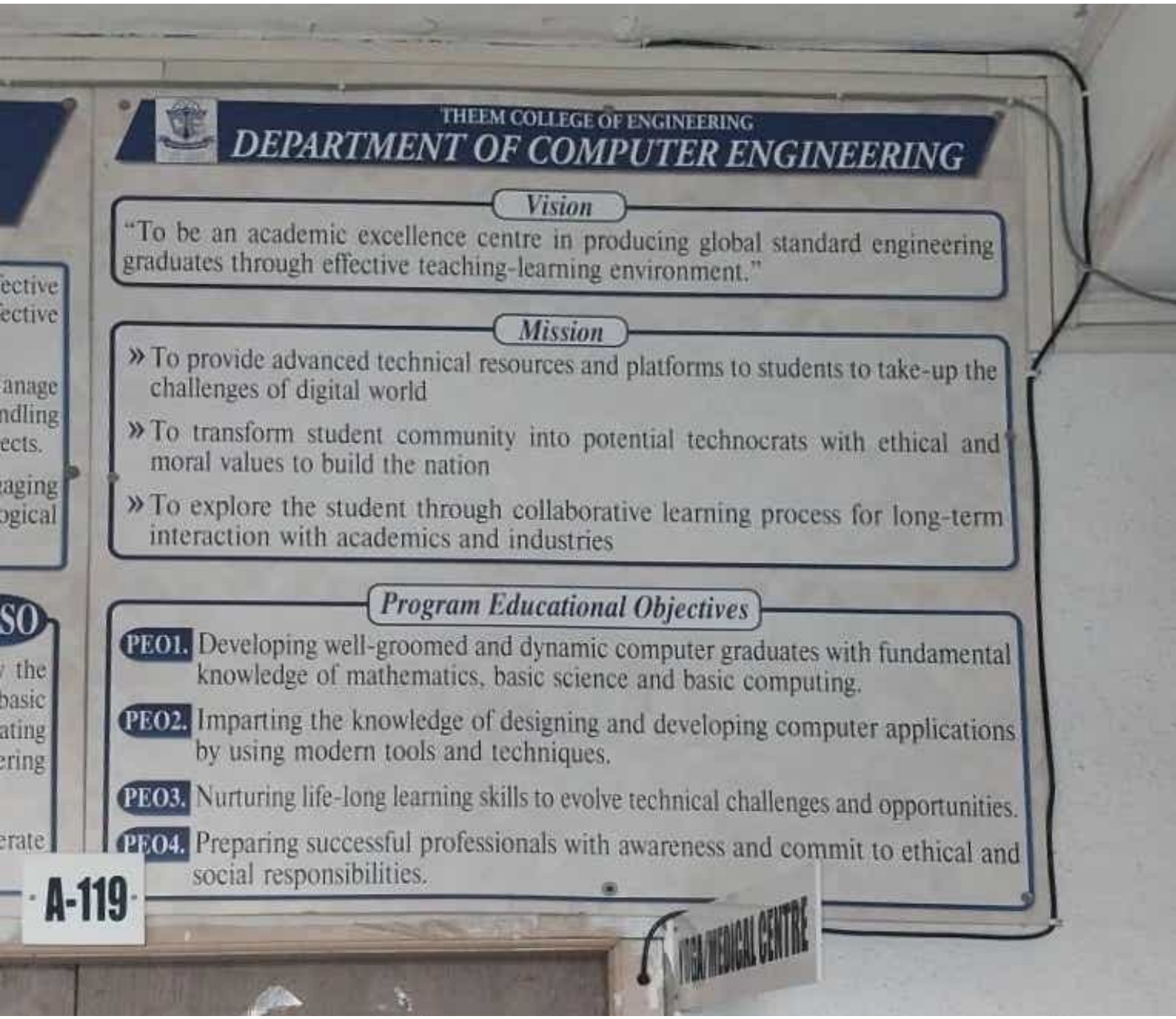
PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.

PO12. Life-long Learning: Recognize the need for long-life learning and possess the ability to engage in the broadest context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to demonstrate database, networking and programming technologies with realistic constraints.

PSO2. Engineering Graduates will be able to design logical algorithms to meet the global needs and problems.


THEEM COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING
Vision
"To be an academic excellence centre in producing global standard engineering graduates through effective teaching-learning environment."
Mission
» To provide advanced technical resources and platforms to students to take-up the challenges of digital world
» To transform student community into potential technocrats with ethical and moral values to build the nation
» To explore the student through collaborative learning process for long-term interaction with academics and industries
Program Educational Objectives
PEO1. Developing well-groomed and dynamic computer graduates with fundamental knowledge of mathematics, basic science and basic computing.
PEO2. Imparting the knowledge of designing and developing computer applications by using modern tools and techniques.
PEO3. Nurturing life-long learning skills to evolve technical challenges and opportunities.
PEO4. Preparing successful professionals with awareness and commit to ethical and social responsibilities.
A-119
VIGIL MEDICAL CENTRE

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving computer engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering specialization for for identifying and analyzing the computer engineering problems to arrive valid conclusions.

PO3. Design/Development of Solutions: Design solutions for computer engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, resources, modern engineering including modeling and prediction to design computer applications for computer engineering activities with understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to computer engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of computer engineering solutions in societal and environmental contexts and demonstrate the knowledge for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the computer engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in computer engineering activities, be able to comprehend and write effective reports, design documentations and make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage multidisciplinary environment with the skill of handling monetary resources in computer engineering projects.

PO12. Life-long Learning: Recognize the need for engaging in life-long learning in the context of technological change.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to apply the knowledge of mathematics, basic science and basic computing in general and in identifying, formulating and solving the real life computer engineering problems.

PSO2. Engineering Graduates will be able to accelerate innovation for industrial and social needs.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Vision

"To set-up a technical excellence centre to produce responsible technocrats to serve the society and nation."

Mission

» To enhance students civil engineering skills through value-based quality education

» To enable students to reach their goals by providing a congenial learning atmosphere

» To inculcate students ethical principles and technically sound professionals to solve the problems of the society

Program Educational Objectives

PEO1. Ensuring to provide basic knowledge of science and mathematics.

PEO2. Imparting civil engineering skills to contribute in developing infrastructure and solving societal problems.

PEO3. Imparting the knowledge of design and analysis for using the codes of practice and software tools.

PEO4. Motivating students for higher studies to serve the community.

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF CIVIL ENGINEERING

Program Outcomes PO

Engineering Graduates will be able to:

PO1. Engineering Knowledge: Apply the knowledge of science, mathematics, engineering fundamentals and engineering specialization for research, innovation and solving civil engineering problems.

PO2. Problem Analysis: Use the basic principles of natural science, mathematics and engineering for identifying and analyzing the civil engineering problems to reach suitable conclusions.

PO3. Design/Development of Solutions: Design solutions for civil engineering problems to meet the specified needs with appropriate consideration to the environment, public health and safety.

PO4. Conduct Investigations of Complex Problems: Use research-based knowledge including design of experiments, data interpretation and synthesis of the information to provide valid conclusions.

PO5. Modern Tool Usage: Select the appropriate techniques, resources, modern engineering technology including modeling and prediction for civil engineering activities with an understanding of the limitations.

PO6. The Engineer and Society: Apply reasoning and logical thinking relevant to civil engineering with understanding of consequent responsibilities towards societal, health, safety, legal and cultural issues.

PO7. Environment and Sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts to conserve suitable environment for sustainable development.

PO8. Ethics: Apply ethical principles, commit to professional ethics and responsibilities and norms of the civil engineering.

PO9. Individual and Teamwork: Function effectively as an individual or as a member or leader in diverse teams and in multidisciplinary settings.

PO10. Communication: Communicate effectively with engineering community in civil engineering activities, be able to comprehend and write effective reports, design documentations to make effective presentation with clear instructions.

PO11. Project Management and Finance: Manage projects in multidisciplinary environment with the skill of handling monetary resources in one's own work.

PO12. Life-long Learning: Recognize the need for life-long learning in the broadest context of globally changing and challenging environment.

Program Specific Outcomes PSO

PSO1. Engineering Graduates will be able to utilize the principles, methods and code of practice to excel in the area of drawing, designing and analysis related to civil engineering system.

PSO2. Engineering Graduates will be able to provide sustainable solution to civil engineering problems.

Theem College of Engineering

COURSE OUTCOMES (COs)

Department of Applied Science and Humanities

SEM	Course Code	Course Name	Course Outcomes
I	FEC101	Engineering Mathematics-I	1. Apply the basic concepts of Complex Numbers and will be able to use it for engineering problems. 2. Apply hyperbolic functions and logarithms in the subjects like electrical circuits, Electromagnetic wave theory. 3. Apply the basic concepts of partial differentiation of function of several variables and will be able to use in subjects like Electromagnetic Theory, Heat and Mass Transfer etc. 4. Apply the concept of Maxima, Minima and Successive differentiation and will be able to use it for optimization and tuning the systems. 5. Apply the concept of Matrices and will be able to use it for solving the KVL and KCL in electrical networks. 6. Apply the concept of Numerical Methods for solving the engineering problems with the help of SCILAB software.
	FEC102	Engineering Physics-I	1. Illustrate the fundamentals of quantum mechanics and its application. 2. Explain peculiar properties of crystal structure and apply them in crystallography using X-ray diffraction techniques. 3. Comprehend the concepts of semiconductor physics and applications of semiconductors in electronic devices. 4. Employ the concept of interference in thin films in measurements. 5. Discuss the properties of Superconductors and Supercapacitors to apply them in novel applications. 6. Compare the properties of engineering materials for their current and futuristic frontier applications.
	FEC103	Engineering Chemistry-I	1. Explain the concept of microscopic chemistry in terms of atomic and molecular orbital theory and relate it to diatomic molecules. 2. Describe the concept of aromaticity and interpret it with relation to specific aromatic systems. 3. Illustrate the knowledge of various types of intermolecular forces and relate it to real gases. 4. Interpret various phase transformations using thermodynamics. 5. Illustrate the knowledge of polymers, fabrication methods, conducting polymers in various industrial fields.
	FEC104	Engineering Mechanics	1. Illustrate the concept of force, moment and apply the same along with the concept of equilibrium in two and three dimensional systems with the help of FBD. 2. Demonstrate the understanding of Centroid and its significance and locate the same. 3. Correlate real life application to specific type of friction and estimate required force to overcome friction. 4. Establish relation between velocity and acceleration of a particle and analyze the motion by plotting the relation 5. Illustrate different types of motions and establish Kinematic relations for a rigid body 6. Analyze particles in motion using force and acceleration, work-energy and impulsemomentum principles
	FEC105	Basic Electrical Engineering	1. Apply various network theorems to determine the circuit response / behavior. 2. Evaluate and analyze 1-Φ circuits. 3. Evaluate and analyze 3-Φ AC circuits. 4. Understand the constructional features and operation of 1-Φ transformer. 5. Illustrate the working principle of 3-Φ machine.
II	FEC201	Engineering Mathematics-II	1. Apply the concepts of First Order and first degree Differential equation to the problems in the field of engineering. 2. Apply the concepts of Higher Order Linear Differential equation to the engineering problems. 3. Apply concepts of Beta and Gamma function to solve improper integrals. 4. Apply concepts of Double integral of different coordinate systems to the engineering problems like area and mass. 5. Apply concepts of triple integral of different coordinate systems to the engineering problems and problems based on volume of solids. 6. Solve differential equations and integrations numerically using SCILAB software to experimental aspect of applied mathematics.
	FEC202	Engineering Physics-II	1. Describe the diffraction through slits and its applications. 2. Apply the foundation of laser and fiber optics in development of modern communication technology. 3. Relate the basics of electrodynamics which is prerequisite for satellite communications, antenna theory etc. 4. Explain the fundamentals of relativity. 5. Assimilate the wide scope of nanotechnology in modern developments and its role in emerging innovating applications. 6. Interpret and explore basic sensing techniques for physical measurements in modern instrumentations.
	FEC203	Engineering Chemistry-II	1. Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques. 2. Illustrate the concept of emission spectroscopy and describe the phenomena of fluorescence and phosphorescence in relation to it. 3. Explain the concept of electrode potential and nernst theory and relate it to electrochemical cells. 4. Identify different types of corrosion and suggest control measures in industries. 5. Illustrate the principles of green chemistry and study environmental impact. 6. Explain the knowledge of determining the quality of fuel and quantify the oxygen required for combustion of fuel.
	FEC204	Engineering Graphics	1. Apply the basic principles of projections in Projection of Lines and Planes 2. Apply the basic principles of projections in Projection of Solids. 3. Apply the basic principles of sectional views in Section of solids. 4. Apply the basic principles of projections in converting 3D view to 2D drawing. 5. Read a given drawing. 6. Visualize an object from the given two views.
	FEC205	C Programming	1. Formulate simple algorithms for arithmetic, logical problems and translate them to programs in C language 2. Implement, test and execute programs comprising of control structures. 3. Decompose a problem into functions and synthesize a complete program. 4. Demonstrate the use of arrays, strings and structures in C language. 5. Understand the concept of pointers
	FEC206	Professional Communication and Ethics	1. Eliminate barriers and use verbal/non-verbal cues at social and workplace situations. 2. Employ listening strategies to comprehend wide-ranging vocabulary, grammatical structures, tone and pronunciation. 3. Prepare effectively for speaking at social, academic and business situations. 4. Use reading strategies for faster comprehension, summarization and evaluation of texts. 5. Acquire effective writing skills for drafting academic, business and technical documents. 6. Successfully interact in all kinds of settings, displaying refined grooming and social skills.

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Boisar (East), Tal. & Dist. Palghar-401 501

Theem College of Engineering

COURSE OUTCOMES (COs)

Department of Computer Engineering

SEM	Course Code	Course Name	Course Outcomes
III	CSC301	Engineering Mathematics-III	1.Understand the concept of Laplace transform and its application to solve the real integrals in engineering problems. 2.Understand the concept of inverse Laplace transform of various functions and its applications in engineering problems. 3.Expand the periodic function by using the Fourier series for real-life problems and complex engineering problems. 4.Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic functions. 5.Apply the concept of Correlation and Regression to the engineering problems in data science, machine learning, and AI. 6.Understand the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
	CSC302	Discrete Structures and Graph Theory	1.Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving. 2.Ability to reason logically. 3.Ability to understand relations, functions, Digraph and Lattice. 4.Ability to understand and apply concepts of graph theory in solving real world problems. 5.Understand use of groups and codes in Encoding-Decoding. 6.Analyze a complex computing problem and apply principles of discrete mathematics to identify solutions.
	CSC303	Data Structure	1.Students will be able to implement Linear and Non-Linear data structures. 2.Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures. 3.Students will be able to explain various data structures, related terminologies and its types. 4.Students will be able to choose appropriate data structure and apply it to solve problems in various domains. 5.Students will be able to analyze and Implement appropriate searching techniques for a given problem. 6.Students will be able to demonstrate the ability to analyze, design, apply and use data structures to solve engineering problems
	CSC304	Digital Logic & Computer Organization and Architecture	1. To learn different number systems and basic structure of computer system. 2. To demonstrate the arithmetic algorithms. 3. To understand the basic concepts of digital components and processor organization. 4. To understand the generation of control signals of computer. 5. To demonstrate the memory organization. 6. To describe the concepts of parallel processing and different Buses.
	CSC305	Computer Graphics	1.Describe the basic concepts of Computer Graphics. 2.Demonstrate various algorithms for basic graphics primitives. 3.Apply 2-D geometric transformations on graphical objects. 4.Use various Clipping algorithms on graphical objects . 5.Explore 3-D geometric transformations, curve representation techniques and projections methods.
	CSM301	Mini Project A	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/experimental/simulations. 5. Analyze the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication.
IV	CSC401	Engineering Mathematics-IV	1.Apply the concepts of eigenvalues and eigenvectors in engineering problems. 2.Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 3.Apply the concept of Z- transformation and inverse in engineering problems. 4.Use the concept of probability distribution and sampling theory to engineering problems. 5.Apply the concept of Linear Programming Problems to optimization. 6. Solve Nonlinear programming problems for optimization of engineering problems.
	CSC402	Analysis of Algorithms	1.Analyze the running time and space complexity of algorithms. 2.Describe, apply and analyze the complexity of divide and conquer strategy. 3.Describe, apply and analyze the complexity of greedy strategy. 4.Describe, apply and analyze the complexity of dynamic programming strategy. 5.Explain and apply backtracking, branch and bound. 6.Explain and apply string matching techniques.
	CSC403	Database Management System	1. Recognize the need of database management system. 2. Design ER and EER diagram for real life applications. 3. Construct relational model and write relational algebra queries. 4. Formulate SQL queries. 5. Apply the concept of normalization to relational database design. 6. Describe the concept of transaction, concurrency and recovery.
	CSC404	Operating System	1.Understand the objectives, functions and structure of OS. 2.Analyze the concept of process management and evaluate performance of processscheduling algorithms. 3.Understand and apply the concepts of synchronization and deadlocks . 4.Evaluate performance of Memory allocation and replacement policies. 5.Understand the concepts of file management. 6.Apply concepts of I/O management and analyze techniques of disk scheduling.
	CSC405	Microprocessor	1.Describe core concepts of 8086 microprocessor. 2.Interpret the instructions of 8086 and write assembly and Mixed language programs. 3.Identify the specifications of peripheral chip. 4.Design 8086 based system using memory and peripheral chips. 5.Appraise the architecture of advanced processors. 6.Understand hyperthreading technology
	CSM401	Mini Project - 1B	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/experimental/simulations. 5. Analyze the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication.

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V	CSC501	Theoretical Computer Science	1. Understand concepts of Theoretical Computer Science, difference and equivalence of DFA and NFA, language described by finite automata and regular expressions. 2. Design Context free grammer, pushdown automata to recognize the language. 3. Develop and understanding of computation through Turing Machine. 4. Acquire fundamental understanding of decidability and undecidability.
	CSC502	Software Engineering	1. Identify requirements, and assess the process models. 2. Plan, schedule and track the progress of the projects. 3. Design the software projects. 4. Do testing of software projects. 5. Identify risks, manage the change to assure quality in software projects.
	CSC503	Computer Network	1.Demonstrate the concepts of data communication at physical layer and compare ISO - OSI model with TCP/IP model. 2.Explore different design issues at data link layer. 3.Design the network using IP addressing and subnetting / supernetting schemes. 4.Analyze transport layer protocols and congestion control algorithms. 5.Explore protocols at application layer.
	CSC504	Data Warehousing and Mining	1.Understand data warehouse fundamentals and design data warehouse with dimensional modelling and apply OLAP operations. 2.Understand data mining principles and perform Data preprocessing and Visualization. 3.Identify appropriate data mining algorithms to solve real world problems. 4.Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining 5.Describe complex information and social networks with respect to web mining.
	CSDLO5012	Internet Programming	1. Implement interactive web page(s) using HTML and CSS. 2. Design a responsive web site using JavaScript. 3. Demonstrate database connectivity using JDBC. 4. Demonstrate Roich Internet Application using Ajax. 5. Demonstrate and differentiate various Web Extensions. 6. Demonstrate web application using Reactive Js.
	CSM501	Mini Project 2A	1. Identify societal/research/innovation/entrepreneurship problems through appropriate literature surveys 2. Identify Methodology for solving above problem and apply engineering knowledge and skills to solve it 3. Validate, Verify the results using test cases/benchmark data/theoretical/inferences/experiments/simulations 4. Analyze and evaluate the impact of solution/product/research/innovation /entrepreneurship towards societal/environmental/sustainable development 5. Use standard norms of engineering practices and project management principles during project work 6. Communicate through technical report writing and oral presentation. • The work may result in research/white paper/ article/blog writing and publication • The work may result in business plan for entrepreneurship product created • The work may result in patent filing. 7. Gain technical competency towards participation in Competitions, Hackathons, etc.
VI	CSC601	System Programming and Compiler Construction	1. Identify the relevance of different system programs. 2. Explain various data structures used for assembler and microprocessor design. 3. Distinguish between different loaders and linkers and their contribution in developing efficient user applications. 4. understand fundamentals of compiler design and identify the relationships among different phases of the compiler.
	CSC602	Cryptography & System Security	1. Understand system security goals and concepts, classical encryption techniques and acquire fundamental knowledge on the concepts of modular arithmetic and number theory. 2. Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication. 3. Apply different message digest and digital signature algorithms to verify integrity and achieve authentication and design secure applications
	CSC603	Mobile Computing	1. To identify basic concepts and principles in computing, cellular architecture. 2. To describe the components and functioning of mobile networking. 3. To classify variety of security techniques in mobile network. 4. To apply the concepts of WLAN for local as well as remote application. 5. To describe Long Term Evaluation (LTE) architecture and its interfaces.
	CSC604	Artificial Intelligence	1 .Ability to develop a basic understanding of AI building blocks presented in intelligent agent. 2 . Ability to choose an appropriate problem solving method and knowledge representation technique. 3. Ability to analyze the strength and weaknesses of AI approaches to knowledge-intensive problem solving. 4. Ability to design models for reasoning with uncertainty as well as the use of unreliable information. 5. Ability to design and develop AI application in real world scenarios.
	CSDLO6011	Internet of Things	1. Understand the concepts of IoT and the Things in IoT. 2. Emphasize core IoT functional Stack and understand application protocols for IoT. 3. Apply IoT knowledge to key industries that IoT is revolutionizing. 4. Examines various IoT hardware items and software platforms used in projects.
	CSM601	Mini Project 2B	1. Identify societal/research/innovation/entrepreneurship problems through appropriate literature surveys 2. Identify Methodology for solving above problem and apply engineering knowledge and skills to solve it 3. Validate, Verify the results using test cases/benchmark data/theoretical/ inferences/experiments/simulations 4. Analyze and evaluate the impact of solution/product/research/innovation /entrepreneurship towards societal/environmental/sustainable development 5. Use standard norms of engineering practices and project management principles during project work 6. Communicate through technical report writing and oral presentation. • The work may result in research/white paper/ article/blog writing and publication • The work may result in business plan for entrepreneurship product created • The work may result in patent filing. 7. Gain technical competency towards participation in Competitions, Hackathons, etc. 8 Demonstrate capabilities of self-learning, leading to lifelong learning. 9 Develop interpersonal skills to work as a member of a group or as leader
	CSC701	Machine Learning	1.To acquire fundamental knowledge of developing machine learning models. 2.To select, apply and evaluate an appropriate machine learning model for the given application. 3.To demonstrate ensemble techniques to combine predictions from different models. 4.To demonstrate the dimensionality reduction techniques.

VII	CSC702	Big Data Analysis	1. Understand the building blocks of Big Data Analytics. 2. Apply fundamental enabling techniques like Hadoop and MapReduce in solving real world problems. 3. Understand different NoSQL systems and how it handles big data. 4. Apply advanced techniques for emerging applications like stream analytics. 5. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications, etc. 6. Apply statistical computing techniques and graphics for analyzing big data.
	CSDC7013	Natural Language Processing	1 To describe the field of natural language processing. 2 To design language model for word level analysis for text processing. 3 To design various POS tagging techniques and parsers. 4 To design, implement and test algorithms for semantic and pragmatic analysis. 5 To formulate the discourse segmentation and anaphora resolution. 6 To apply NLP techniques to design real world NLP applications.
	CSDC7023	Information Retrieval	1 Define and describe the basic concepts of the Information retrieval system. 2 Design the various modeling techniques for information retrieval systems. 3 Understand the query structure and various query operations 4 Analyzing the indexing and scoring operation in information retrieval systems 5 Perform the evaluation of information retrieval systems 6 Analyze various information retrieval for real world application
	ILO 7016	Cyber Security and Laws	1. Understand the concept of cybercrime and its effect on outside world 2. Interpret and apply IT law in various legal issues 3. Distinguish different aspects of cyber law 4. Apply Information Security Standards compliance during software design and development
	CSP701	Major Project 1	1. To develop the understanding of the problem domain through extensive review of literature. 2. To Identify and analyze the problem in detail to define its scope with problem specific data. 3. To know various techniques to be implemented for the selected problem and related technical skills through feasibility analysis. 4. To design solutions for real-time problems that will positively impact society and environment.. 5. To develop clarity of presentation based on communication, teamwork and leadership skills. 6. To inculcate professional and ethical behavior.
VIII	CSC801	Human Machine Interaction	1. Identify User Interface (UI) design principles. 2. Analysis of effective user friendly interfaces. 3. Apply Interactive Design process in real world applications. 4. Evaluate UI design and justify. 5. Create application for social and technical task.
	CSC802	Distributed Computing	1. Demonstrate knowledge of the basic elements and concepts related to distributed system technologies; 2. Illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware. 3. Analyze the various techniques used for clock synchronization and mutual exclusion 4. Demonstrate the concepts of Resource and Process management and synchronization algorithms. 5. Demonstrate the concepts of Consistency and Replication Management. 6. Apply the knowledge of Distributed File System to analyze various file systems like NFS, AFS and the experience in building large-scale distributed applications.
	CSDC8012	Digital Forensics	1. Discuss the phases of Digital Forensics and methodology to handle the computer security incident. 2. Describe the process of collection, analysis and recovery of the digital evidence. 3. Explore various tools to analyze malwares and acquired images of RAM/hard drive. 4. Acquire adequate perspectives of digital forensic investigation in mobile devices 5. Analyze the source and content authentication of emails and browsers. 6. Produce unambiguous investigation reports which offer valid conclusions.
	CSDC8023	Social Media Analytics	1. Understand the concept of Social media 2. Understand the concept of social media Analytics and its significance. 3. Learners will be able to analyze the effectiveness of social media 4. Learners will be able to use different Social media analytics tools effectively and efficiently. 5. Learners will be able to use different effective Visualization techniques to represent social media analytics. 6 Acquire the fundamental perspectives and hands-on skills needed to work with social media data.
	ILO 8028	Digital Business Management	1. Identify drivers of digital business 2. Illustrate various approaches and techniques for E-business and management 3. Prepare E-business plan
	CSP801	Major Project 2	1. Implement solutions for the selected problem by applying technical and professional skills. 2. Analyze impact of solutions in societal and environmental context for sustainable development. 3. Collaborate best practices along with effective use of modern tools. 4. Develop proficiency in oral and written communication with effective leadership and teamwork. 5. Nurture professional and ethical behavior. 6. Gain expertise that helps in building lifelong learning experience.

THEEM COLLEGE OF ENGINEERING BOISAR

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Theem College of Engineering

COURSE OUTCOMES (COs)

Department of Automobile Engineering

SEM	Course Code	Course Name	Course Outcomes
III	AEC301	Engineering Mathematics III	1. Apply the concept of Laplace transform to solve the real integrals in engineering problems. 2. Apply the concept of inverse Laplace transform of various functions in engineering problems. 3. Expand the periodic function by using Fourier series for real life problems and complex engineering problems. 4. Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory. 5. Apply Matrix algebra to solve the engineering problems. 6. Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations
	AEC302	Strength of Materials	1. Demonstrate fundamental knowledge about various types of loading and stresses induced. 2. Draw the SFD and BMD for different types of loads and support conditions. 3. Analyse the bending and shear stresses induced in beam. 4. Analyse the deflection in beams and stresses in shaft. 5. Analyse the stresses and deflection in beams and Estimate the strain energy in mechanical elements. 6. Analyse buckling phenomenon in columns
	AEC303	Production Processes	1. Demonstrate an understanding of casting process 2. Illustrate principles of forming processes. 3. Demonstrate applications of various types of welding processes. 4. Differentiate chip forming processes such as turning, milling, drilling, etc. 5. Illustrate the concept of producing polymer components and ceramic components. 6. Illustrate principles and working of non-traditional manufacturing 7. Understand the manufacturing technologies enabling Industry 4.
	AEC304	Materials and Metallurgy	1. Identify the various classes of materials and comprehend their properties 2. Apply phase diagram concepts to engineering applications 3. Apply particular heat treatment for required property development 4. Identify the probable mode of failure in materials and suggest measures to prevent them 5. Choose or develop new materials for better performance 6. Decide an appropriate method to evaluate different components in servic
	AEC305	Thermodynamics	1. Demonstrate application of the laws of thermodynamics to a wide range ofsystems. 2. Compute heat and work interactions in thermodynamicsystems 3. Demonstrate the interrelations between thermodynamic functions to solve practicalproblems. 4. Compute thermodynamicinteractions using the steam table and Mollier chart 5. Compute efficiencies of heat engines, power cycles. 6. Apply the fundamentals of compressible fluid flow to the relevant systems
	AEPBL301	Mini Project – 1A	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
IV	AEC401	Engineering Mathematics-IV	1. Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem & Gauss Divergence theorem. 2. Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 3. Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science. 4. Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. 5. Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory. 6. Apply the concepts of parametric and nonparametric tests for analyzing practical problems.
	AEC402	Fluid Mechanics	1. Define properties of fluids, classify fluids and evaluate hydrostatic forces on various surfaces. 2. Illustrate understanding ofdimensional analysis of Thermal and Fluid systems. 3. Differentiate velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow. 4. Formulate and solve equations of the control volume for fluid flow systems and Apply Bernoulli's equation to various flow measuring
	AEC403	Kinematics of Machinery	1. Identify various components of mechanisms 2. Develop mechanisms to provide specific motion 3. Draw velocity and acceleration diagrams of various mechanisms 4. Choose a cam profile for the specific follower motion 5. Predict condition for maximum power transmission in the case of a belt drive 6. Illustrate requirements for an interference-free gear pair
	AEC404	CAD/CAM	1. Identify suitable computer graphics techniques for 3D modeling. 2. Transform, manipulate objects & store and manage data. 3. Develop 3D model using various types of available biomedical data. 4. Create the CAM Toolpath for specific given operations. 5. Build and create data for 3D printing of any given object using rapid prototyping and tooling processes. 6. Illustrate understanding of various cost effective alternatives for manufacturing products.
	AEC405	Industrial Electronics	1. Illustrate construction, working principles and applications of power electronic switches. 2. Identify rectifiers and inverters for dc and ac motor speed control. 3. Develop circuits using OPAMP and Timer IC 555. 4. Identify digital circuits for industrial applications. 5. Demonstrate the knowledge of basic functioning of microcontrollers. 6. Analyze speed-torque characteristics of electrical machines for speed control.

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	AEPBL401	Mini Project – 1B	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
V	AEC501	Mechanical Measurements & Controls	1. Handle, operate and apply the precision measuring instruments / equipment's. 2. Analyze simple machined components for dimensional stability & functionality. 3. Classify various types of static characteristics and types of errors occurring in the system. 4. Classify and select proper measuring instrument for displacement, pressure, flow and temperature measurements. 5. Design mathematical model of system/process for standard input responses and analyse error and differentiate various types of control systems and time domain specifications 6. Analyse the problems associated with stability.
	AEC502	Internal Combustion Engines	1. Explain the actual engine operation 2. Analyse the combustion process in IC engines 3. Illustrate different power boosting methods in IC Engines 4. Analyse operating parameters & performance of IC Engines 5. Illustrate emission norms and emission control techniques 6. Comprehend the recent trends in fuels and engines
	AEC503	Machine Design	1. Design Knuckle Joint and cotter joint 2. Design shaft under various conditions 3. Design rigid and flexible flange couplings 4. Design helical compression spring and leaf spring 5. Use design data books in designing various components 6. Report uncertainties associated with potential failure modes inherited from the component design.
	AEC504	Finite Element Analysis	1. Solve differential equations using weighted residual methods. 2. Develop the finite element equations to model engineering problems governed by second order differential equations. 3. Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements. 4. Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements. 5. Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system. 6. Use commercial FEA software, to solve problems related to mechanical engineering.
	AEDLO5011	Optimization Techniques	1. Identify the types of optimization problems and apply the calculus method to single variable problems. 2. Formulate the problem as Linear Programming problem and analyse the sensitivity of a decision variable. 3. Apply various linear and non-linear techniques for problem solving in various domain. 4. Apply multi-objective decision making methods for problem in manufacturing environment and other domain. 5. Apply multi criterion decision making methods for problem in manufacturing environment \and other domain. 6. Apply Design of Experiments method for Optimization
	AEPBL501	Mini Project – 2 A	1. Identify problems based on societal /research needs 2. Apply Knowledge and skill to solve societal problems in a group 3. Develop interpersonal skills to work as member of a group or leade 4.Draw the proper inferences from available results through theoretical/ experimental/simulations 5. Analyse the impact of solutions in societal and environmental context for sustainable development 6. Use standard norms of engineering practice 7. Excel in written and oral communication 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning 9. Demonstrate project management principles during project work.
VI	AEC601	Automotive System Design	1. Identify different Automotive systems and components 2. Compare different types of Automotive systems and components 3. Understand the working of different types of Automotive systems and component 4. Apply knowledge of Engineering Mechanics and Strength of materials to design different Automotive systems and components 5. Select materials for different Automotive systems and components for designing 6. Design the different Automotive systems and components by using a data book.
	AEC602	Mechanical Vibrations	1. Develop mathematical models to represent dynamic system 2. Estimate natural frequency of mechanical system using various methods 3. Analyze vibratory response of mechanical system under forced vibration 4. To estimate the natural frequencies and mode shapes of multi-degree of freedom system, using both exact and numerical methods 5 . Balance an existing unbalanced system partially/completely
	AEC603	Vehicle Body Engineering and Safety	1. Illustrate different types of Vehicle structures 2. Comprehend various loads acting on vehicle body 3. Classify different materials related to vehicle body 4. Discuss Aerodynamic concept related to vehicle body 5. Comprehend Vehicle design from safety point of view 6. Enumerate interrelation ship among occupant, restraint systems and vehicles in accidents.
	AEC604	Automation and Artificial Intelligence	1. Demonstrate understanding of fundamentals of industrial automation and AI 2. Design & develop pneumatic / hydraulic circuits 3. Design and develop electropneumatic circuits and PLC ladder logics 4. Demonstrate understanding of robotic control systems and their applications 5. Demonstrate understanding of various AI and machine learning technologies.
	AEDLO6021	Press Tool Design	1. Demonstrate various press working operations for mass production of sheet metal parts 2. Identify press tool requirements to build concepts pertaining to design of press tools 3. Prepare working drawings and setup for economic production of sheet metal components 4. Select suitable materials for different elements of press tools 5. Illustrate the principles and blank development in bent & drawn components 6. understand safety aspects and automation in press working

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	AEPBL601	Mini Project – 2 B	1. Identify problems based on societal /research needs 2. Apply Knowledge and skill to solve societal problems in a group 3. Develop interpersonal skills to work as member of a group or leader 4. Draw the proper inferences from available results through theoretical/ experimental/simulations 5. Analyse the impact of solutions in societal and environmental context for sustainable development 6. Use standard norms of engineering practices 7. Excel in written and oral communication 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning 9. Demonstrate project management principles during project work.
VII	AEC701	Autotronics	1. Illustrate working of different batteries and modern Energy storage methods used in automobiles 2. Demonstrate working of Charging system used in automobiles 3. Illustrate working of starting system and drives used in automobiles 4. Draw and Interpret lighting and wiring systems in automobile 5. Comprehend working of different Automotive & Communication Protocols and actuators used in automobiles 6. Elaborate working of Automotive Diagnostics with its procedure and equipment used.
	AEC702	Vehicle Dynamics	1. Analyze the vehicle directional stability 2. Enumerate the suspension systems, tire dynamics & directional stability of the vehicle 3. Develop physical and mathematical models to predict the dynamic response of vehicle 4. Demonstrate the ride characteristic of the vehicle 5. Analyze the vehicle roll behaviour 6. Comprehend the various trends in Vehicle Dynamics.
	AEDLO7031	Vehicle Performance and Testing	1. Identify vehicle categories and their regulations requirements 2. Explain automotive engine test requirements 3. Explain automotive vehicle test requirements 4. Explain automotive crash test and safety requirements 5. Explain automotive component testing requirements 6. Explain the automotive xEV testing requirement
	AEDLO7041	Transport Management Systems	1. Explain the basics of Motor Vehicle Act 2. Know the way of applying tax on Motor Vehicle 3. Apply the basic knowledge of Motor Vehicle Insurance 4. Apply the basic knowledge of Passenger & goods transportation system operations 5. Implement advance techniques in traffic management
	ILO7017	Disaster Management and Mitigation Measures	1. Get to know natural as well as manmade disaster and their extent and possible effects on the economy 2. Plan of national importance structures based upon the previous history 3. Get acquainted with government policies, acts and various organizational structure associated with an emergency 4. Get to know the simple do's and don'ts in such extreme events and act accordingly.
	AEP701	Major Project I	1. Students will be able to develop the understanding of the problem domain through extensive review of literature 2. Students will be able to identify and analyze the problem in detail to define its scope with problem specific data 3. Students will be able to identify various techniques to be implemented for the selected problem and related technical skills through feasibility analysis 4. Students will be able to design solutions for real-time problems that will positively impact society and environment 5. Students will be able to develop clarity of presentation based on communication, teamwork and leadership skills 6. Students will be able to inculcate professional and ethical behavior.
VIII	AEC801	Hybrid and Electric Vehicles	1. Explain the need and evolution of electric & hybrid electric vehicles 2. Identify and Demonstrate the working principle of different EV/HEV's configurations 3. Compare various energy sources for EV's and HEV's 4. Design drivetrain parameters for EV's and HEV's 5. Elaborate the use of fuel cells in vehicular applications 6. Understand the need of BMS and chargers in EV's.
	AEDLO8051	Automotive Materials	1. Identify the need for new alternative materials that are lighter to improve efficiency of automobiles 2. Apply different processing routes for composites and plastics for making exterior and interior parts of automobiles 3. Estimate the role of different classes of materials for various automotive systems 4. Suggest technologies to make automotive glasses lighter and tougher 5. Develop advanced materials/biocomposites for specific automobile applications 6. To Comprehend and use Ashby charts for material selection
	AEDLO8061	Product Design and Development	1. Describe the process of product design & development 2. Employ engineering, scientific, and mathematical principles to develop and execute a design project from a concept to a finished product 3. Create 3D solid models of mechanical components using CAD software. 4. Demonstrate individual skills using selected manufacturing techniques such as rapid prototyping 5. Fabricate an electromechanical assembly of a product from engineering drawings 6. Work collaboratively in a team to complete a design project 7. Effectively communicate the results of projects and other assignments both in a written and oral format.
	ILO8029	Environmental Management	1. Understand the concept of environmental management 2. Understand ecosystem and interdependence, food chain etc. 3. Understand and interpret environment related legislations
	AEP801	Major Project II	1. Students will be able to implement solutions for the selected problem by applying technical and professional skills 2. Students will be able to analyze impact of solutions in societal and environmental context for sustainable development 3. Students will be able to collaborate best practices along with effective use of modern tools 4. Students will be able to develop proficiency in oral and written communication with effective leadership and teamwork 5. Students will be able to nurture professional and ethical behavior 6. Students will be able to gain expertise that helps in building lifelong learning experience.

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PRINCIPAL
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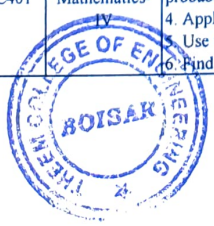
Boisar (East), Tal. & Dist. Palghar-401 501

Theem College of Engineering
COURSE OUTCOMES (COs)

Department of Electrical Engineering

SEM	Course Code	Course Name	Course Outcomes
III	EEL301	Engineering Mathematics-III	1. Apply the concept of Laplace transform to solve the real integrals in engineering problems. 2. Apply the concept of inverse Laplace transform of various functions in engineering problems. 3. Expand the periodic function by using Fourier series for real life problems and complex engineering problems. 4. Find orthogonal trajectories and analytic function by using basic concepts of complex 5. Illustrate the use of matrix algebra to solve the engineering problems. 6. Apply the concepts of vector calculus in real life problems.
	EEL302	Electrical Circuit Analysis	1. Apply network theorems for the analysis of electrical circuits. 2. Obtain the transient and steady-state response of electrical circuits. 3. Develop and analyse transfer function model of system using two port network parameters. 4. Analyse time domain behaviour from pole zero plot. 5. Analyse electrical network using graph theory. 6. Analyse the effect of switching conditions on electrical networks using differential equations and Laplace Theorem.
	EEL303	Fundamentals of Electrical Machines & Measurements	1. Illustrate the principle of energy conversion in single and double excited machines. 2. Understand and analyze the significance of the DC machines performance parameters. 3. Implement various starting methods and speed control methods for DC machines applications 4. Evaluate the working of various sensors, transducers and analog / digital instruments used in electrical and electronic measurements. 5. Analyze the use and performance of bridges used in electrical and electronic measurements. 6. Illustrate the need for extension of range of meters and calibration in instruments.
	EEL304	Electrical Power System I	1. Understand the power system and its components. 2. Categorize the ac transmission / distribution lines and understand the insulators. 3. Evaluate the parameters of different types of ac transmission / distribution lines. 4. Draw the PU reactance diagram of a power system for analysis. 5. Analyse the performance of transmission lines. 6. Study the performance parameters of electric cable and earthing.
	EEL305	Analog Electronics	1. Analyze the performance of various rectifiers and filter circuits. 2. Illustrate the use DC and AC parameters of BJT in analysis of amplifier circuits. 3. Apply the knowledge of MOSFET's DC/ AC parameters in analysis of amplifier and switching applications of MOSFET. 4. Understand the functioning of OP-AMP and design OP-AMP based circuits. 5. Illustrate the practical design aspect of regulated power supply circuits using linear regulators. 6. Understand applications of commonly used special semiconductor devices.
	EEL301	Electrical Machines & Measurements Lab	1. Illustrate and analyze the performance of DC machines. 2. Demonstrate different speed control methods of DC motors. 3. Illustrate and analyze the working of various sensors, transducers and instruments used for measurement of the various physical parameters. 4. Demonstrate the use of bridges for measurements of passive electrical components. 5. Understand and analyse the working signal processing circuits used in measurements and instruments
	EEL302	Electronics Lab-I	1. Identify the different types of semiconductor devices and demonstrate their applications in electronic circuits. 2. Analyse the performance of different types of rectifier with and without filter. 3. Determine the dc and ac parameters of various semiconductor devices. 4. Illustrate the frequency response of BJT/ MOSFET amplifier. 5. Understand the practical use of Op-amps in signal processing and waveform generators.
	EEL303	Simulation Lab-I	1. Develop the skill to use the software packages to model and program electrical and electronics systems 2. Model different electrical and electronic systems and analyze the results 3. Articulate importance of software packages used for simulation in laboratory experimentation /research/industry by analyzing the simulation results. 4. Simulate electric machines/circuits for performance analysis.
	EEL304	SBL-I: Applied Electrical Engineering Lab	1. Demonstrate the effective use of various electrical and electronic measuring lab equipments. 2. Identify various electrical LV/HV substation, supply equipments and their network connection 3. Identify and use different low voltage protective switchgears along with residential / industrial wiring practices. 4. Illustrate the understanding of Repair and maintenance of common electrical appliances. 5. Handle Electrical fire and shock hazards safety challenges in real practice.
	EEM301	Mini Project – 1A	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	EEC401	Engineering Mathematics-IV	1. Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 2. Demonstrate the use of Correlation and Regression to the engineering problems in data science, machine learning and AI. 3. Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. 4. Apply the concept of vector spaces and orthogonalization process in Engineering Problems. 5. Use the concept of Quadratic forms and Singular value decomposition in various Engineering applications. 6. Find the extremals of the functional using the concept of Calculus of variation.



IV	EEC402	Electrical AC Machines-I	1. Illustrate working principle and performance of single phase transformer under different operating conditions 2. Understand working principle of autotransformer. 3. Analyze various types of connections and performance of three phase transformer under various conditions. 4. Demonstrate working principle and evaluate the performance of three phase induction motor under various operating conditions. 5. Exemplify various starting methods and speed control of three phase induction motor.
	EEC403	Digital Electronics	1. Perform conversion of various number systems 2. Understand working of logic families and logic gates. 3. Design and implement combinational circuits. 4. Design and implement sequential circuits. 5. Understand the process of Analog to Digital conversion and Digital to Analog conversion. 6. Illustrate the use of PLDs to implement the given logical problem.
	EEC404	Power Electronic Devices and Circuits	1. Understand the basic operation and characteristics of various semi controllable and fully controllable devices 2. Analyse various single phase and three phase power converter circuits and understand their applications. 3. Analyse dc to dc converter circuits and their applications. 4. Identify and describe various auxiliary circuits and requirements in power electronics applications such as gate driver circuit, snubber circuits and heat sinks. 5. Apply the basic concepts to select devices and converters for various applications
	EEC405	Electric and Hybrid Electric Vehicles	1. Identify and describe the history and evolvement of electric & hybrid electric vehicles. 2. Identify and describe the principles of various EV/HEVs drive train topologies. 3. Select electric propulsion system components for EV/HEV drives for the desirable performance and control. 4. Compare and evaluate various energy sources and energy storage components for EV/HEV. 5. Model, analyze and design EV/HEV drive train with energy management strategies. 6. Recognize the need to adapt and engage in operations EV/HEV for sustainable transportation system.
	EEL401	Electrical AC Machines Lab I	1. Demonstrate the working principles and types of connections of 1φ and 3φ transformers. 2. Analyze the performance of 3φ transformer under various operating conditions. 3. Evaluate the performance of 3φ induction motor by carrying no load test , blocked rotor test and load test 4. Illustrate the operation of various type of 3φ induction motor starters. 5. Illustrate different methods of speed control and braking of 3φ induction motors.
	EEL402	Python Programming Lab	1. Describe the numbers, Math functions, Strings, List, Tuples and Dictionaries in Python 2. Express different Decision Making statements and Functions 3. Illustrate the skill of object oriented programming in Python to develop applications in electrical engineering 4. Understand different File handling operations 5. Understand the design of GUI Applications in Python and evaluate different database operations
	EEL403	Electronics Lab II	1. Use various digital logic Gates, flip-flops and counters for various applications 2. Build, design and analyse sequential / combinational circuits. 3. Understand the operation various power electronics devices and circuits 4. Use power converters for various real life applications 5. Realize the implementation of digital interface with power electronics converters
	EEL404	SBL-II : PCB Design and Fabrication Lab	1. Understand types of PCBs and various tools used for PCB design. 2. Identify various electrical/electronic components and their packages/ footprints. 3. Illustrate the use of PCB CAD tools and their features for the practical designs. 4. Design the schematic, board layout for simple, moderately complex and complex circuits. 5. Fabricate and assemble the PCBs for simple and moderately complex circuits.
	EEM401	Mini Project – 1B	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	EEC501	Electrical AC Machines II	1. To illustrate the working of synchronous generator 2. To determine the voltage regulation of synchronous generator by different methods 3. To analyze the parallel operation of synchronous generators. 4. To apply Blondel's two reaction theory and solve simple problems on salient pole synchronous machines. 5. To analyze the operation of synchronous motor. 6. To derive the basic machine relations in dq0 variables for a synchronous machine without considering damper winding.
	EEC502	Electrical Power System II	1. Understand and analyse unsymmetrical faults on transmission line 2. Analyse symmetrical component and construct sequence network 3. Analyse symmetrical faults on transmission lines. 4. Understand power system transients 5. Understand phenomenon of lightning and insulation coordination. 6. Understand concept of corona.
	EEC503	Control System	1. Demonstrate an understanding of the fundamentals of (feedback) control systems. 2. Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. 3. Express and solve system equations in state-variable form (state variable models). 4. Determine the time and frequency-domain responses of first and second-order systems to step and sinusoidal (and to some
	EEC504	Electromagnetic Field and Wave	1. Apply knowledge of mathematics and physics in electrical engineering field. 2. Analyze electrostatic fields 3. Apply and analyse magneto-static fields. 4. Analyze the effect of material medium on electric and magnetic fields. 5. Analyze and formulate time varying electric and magnetic fields. 6. Formulate wave equations for Electromagnetic wave propagation in different media.

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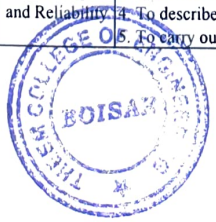
V	EEDO5011	Renewable Energy Sources	1. Understand different types conventional energy sources and their reserves 2. Identify and analyse the process of power generation through solar thermal energy utilization 3. Identify and analyse the process of power generation through solar photovoltaic energy utilization 4. Identify and describe the various components and types of Wind Energy system 5. Identify and describe the basic operation and types of Fuel cell system 6. Understand different types of other non-conventional energy sources
	EEL501	Electrical AC Machines Lab II	1. To analyze the operation of synchronous machines 2. To determine the voltage regulation of synchronous machines 3. To analyze the synchronization (or parallel operation) of synchronous machines 4. To determine the parameters of synchronous machines
	EEL502	Simulation Lab II	1. Develop the skill to use the software packages to model and program electrical and electronics systems 2. Model different electrical and electronic systems and analyze the results 3. Articulate importance of software packages used for simulation in laboratory experimentation /research/industry by analyzing the simulation results. 4. Simulate circuits for performance analysis.
	EEL503	Control System Lab	1. Illustrate the functioning of various components of control system. 2. Analyse the response of physical system for various inputs. 3. Analyze and interpret stability of the system through Root Locus, Bode plot and Nyquist plots 4. Execute time response analysis of a second order control system using MATLAB
	EEL504	Professional Communication and Ethics-II	1. Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles. 2. Strategize their personal and professional skills to build a professional image and meet the demands of the industry. 3. Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations. 4. Deliver persuasive and professional presentations. 5. Develop creative thinking and interpersonal skills required for effective professional communication. 6. Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.
	EEM501	Mini Project – 2 A	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/ simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life-long learning. 9. Demonstrate project management principles during project work
VI	EEC601	Power System Protection and Switchgear	1. To select the appropriate switching/protecting device forsubstations. 2. To discriminate between the application of circuit breaker and fuses as a protective device. 3. To understand the basic concept of relay, types of relay and their applications in power system. 4. To select the specific protection required for different components of power system according to the type of fault. 5. To apply the specific protection provided for different types of transmission lines.
	EEC602	Microcontroller Applications	1. To analyse the difference between microprocessor and microcontroller based systems. 2. To write, debug and execute the software programs for internal peripheral devices of microcontroller. 3. To write, debug and execute the software programs for external peripheral devices for microcontroller based systems. 4. To design and implement the peripheral devices interfacing with microcontroller
	EEC603	Control System Design	1. Define fundamental control system design specifications and basic principles of controller design 2. Understand the basic design of various compensators. 3. Design compensators using root locus techniques. 4. Design modern controllers based on the state space techniques, 5. Recognize the importance of observability and controllability for system design.
	EEC604	Signals and Systems	1. Discriminate continuous and discrete time signals and systems. 2. Understand the transformation of discrete time signal to Z domain. 3. Analyse frequency response of systems using Z domain. 4. Design, implementation, analysis and comparison of digital filters for processing of discrete time signals
	EEDO6014	Energy Storage	1. To illustrate the importance of energy storage systems in Power systems and other application domains 2. To illustrate the operational features of various energy storage technologies 3. To understand the principles and types of thermal, mechanical, electrochemical and electrical energy storage systems. 4. To compare and contrast different types of Energy storage systems 5. To illustrate the hybridization of various ES technology to improve the performance 6. To calculate the capacity of ES system for various application requirements,
	EEL601	Power System Protection & Switchgear Lab	1. To understand the working principle of various protective devices like Circuit breakers, fuses, switches and contactors. 2. To understand the concept of various over current protection scheme and its applications in power system. 3. To understand different protection schemes of transformer and Induction motor. 4. To understand protection schemes of transmission line.
	EEL602	Microcontroller Applications Lab	1. To write, debug and execute Assembly language based programs. 2. To write, debug and execute embedded language based programs. 3. To design and implement the interfacing of internal peripheral devices. 4. To design and implement the interfacing of external peripheral devices.
	EEL603	Control System Design Lab	1. Implement various types of compensators and control algorithms using simulation platforms 2. Apply root-locus & Bode Plot techniques to analyze and design control systems. 3. Able to design digital controllers, assess their design through the constraint specifications
	EEL604	SBL-III: Industrial Automation Lab	1. To comprehend with various components and subsystems used in industrial automation 2. To understand the integration of components and sub-systems. 3. To interface the microcontroller / PLC with external devices/ sensors/ actuators. 4. To interface the microcontroller / PLC with control circuits. 5. To design /implement / integrate such systems for any given applications

	EEM601	Mini Project – 2 B	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life-long learning. 9. Demonstrate project management principles during project work
VII	EEC701	Electrical Drives & Control	1. To apply the knowledge of dynamics to solve problems on electrical drives. 2. To select the power rating of a motor based on duty cycle. 3. To illustrate the modes of operation and control schemes (both open and closed loop) of electrical drive. 4. To analyze the speed control of DC drives with waveforms. 5. To analyze various methods of speed control and braking methods used in induction motor drives. 6. To describe the advanced control techniques used in induction motor drives.
	EEC702	Electrical Power System III	1. Solve Load scheduling and unit commitment problem 2. Define and classify power system stability 3. Determine critical clearing angle using techniques like equal area criterion 4. Formulate load flow problem and solve it by using different techniques 5. Model single area load frequency control and analyse its steady state and dynamic behavior 6. Understand concept of interchange of power and energy
	EEDO7012	HVDC Transmission Systems	1. Identify significance of dc over ac transmission systems, types of HVDC link, Components of HVDC system and applications. 2. Analyze multi-pulse converters. 3. Illustrate the basic control of HVDC system and its limitation, features and implementation. 4. Describe the converter firing control schemes for starting and stopping of HVDC link. 5. Understand and analyze faults and protection of HVDC system. 6. Illustrate the harmonics, their causes, effects and use of different filters.
	EEDO7014	Microgrid and Smart-grid	1. To identify and describe the impact of renewable energy integration for mitigating energy crises and sustainable future. 2. To identify and describe the concept of Microgrid and its various topologies, modes of operation control and communication architecture. 3. To identify and describe the concept of Smart Grid, its features and the state of the art. 4. To understand various Smart Grid technologies, automation, resiliency and its adoption in current power system.
	EEIO7018	Energy Audit and Management	1. To identify and describe present state of energy security and its importance. 2. To identify and describe the basic principles and methodologies adopted in energy audit of a utility. 3. To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities. 4. To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities 5. To analyze the data collected during performance evaluation and recommend energy saving measures
	EEL701	Electrical Drives & Control Lab	1. To impart practical knowledge on electrical drives and its control 2. To analyze the dynamic performance of ac and dc drives. 3. To analyze the dynamics of electrical braking in ac and dc drives 4. To analyze the control aspects and the performance of power electronic drives. 5. To use simulation tools to evaluate the performance of ac and dc drive
	EEL702	Simulation Lab III	1. Develop the skill to use the software packages to model and program electrical and electronics systems 2. Model different electrical and electronic systems and analyze the results 3. Articulate importance of software packages used for simulation in laboratory experimentation /research/industry by analyzing the simulation results. 4. Simulate circuits for performance analysis.
	EEL703	Power Electronics Design Lab	1. Illustrate design of auxiliary circuits for Power Electronic systems. 2. Analyse the requirements, model and design a compensator for a power electronic converter. 3. Create a power electronic converter for a particular application. 4. Implement control algorithm for a power electronic converter in hardware / simulation platform
	EEP701	Major Project I	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/ simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life-long learning. 9. Demonstrate project management principles during project work
	EEC801	Electrical System Design, Management	1. To do sizing, selecting transformer, switchgear and cable as required for distribution system 2. To illustrate Engineering knowledge in energy audit and energy efficient technologies to improve energy efficiency 3. Describe the energy conservation through energy monitoring and targeting 4. Analyse and Evaluate the energy audit data for targeting possible opportunities of energy saving
	EEDO8011	Power Quality and FACTs	1. Analyze the problems due to non-linear loads 2. Suggest the solution to improve power quality. 3. Illustrate the aspects of flexible ac transmission system over conventional ac transmission system and analyze the concept of load compensation.
	EEDO8021	Power System Planning and Reliability	1. To explain the basic modelling of power system components for reliability evaluation and planning. 2. To describe load forecasting models for short-term and long-term power system planning. 3. To describe the methodologies to solve generation system reliability calculation and generation planning. 4. To describe how to calculate reliability indices for combined generation and transmission systems. 5. To carry out planning and reliability for distribution system.



VIII	EEIO8021	Project Management	1. Apply selection criteria and select an appropriate project from different options. 2. Write work break down structure for a project and develop a schedule based on it. 3. Identify opportunities and threats to the project and decide an approach to deal with them strategically 4. Use Earned value technique and determine & predict status of the project. 5. Capture lessons learned during project phases and document them for future reference
	EEL801	Electrical System Design and Audit Lab	1. Prepare the SLD for electrical system 2. Evaluate the energy efficiency of the electrical systems 3. Size and select the cable for electrical distribution network 4. Analyse the impact of various energy efficient technologies 5. Illustrate the impact of fuel substitution on energy consumption 6. Design energy efficient electrical system
	EEL802	Measurement and Instrumentation Lab	1. Understand the construction, principle and characteristics of different types of digital measuring instruments 2. Apply the knowledge about different instruments and can identify the best suitable instrument for a required typical measurement. 3. Learn about the digital programming of different types of circuits. 4. Understand the conversion of digital to analog signal and vice versa.
	EEP801	Major Project II	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader 4. Draw the proper inferences from available results through theoretical/ experimental/ simulations. 4. Analyse the impact of solutions in societal and environmental context for sustainable development. 5. Use standard norms of engineering practices 6. Excel in written and oral communication. 7. Demonstrate capabilities of self-learning in a group, which leads to life-long learning. 8. Demonstrate project management principles during project work

THEEM COLLEGE OF ENGINEERING BOISAR

PRINCIPAL
THEEM COLLEGE OF ENGINEERING

Theem College of Engineering
COURSE OUTCOMES (COs)

Department of Civil Engineering

SEM	Course Code	Course Name	Course Outcomes
III	CEC301	Engineering Mathematics-III	1 Apply the concept of Laplace transform to solve the real integrals in engineering problems 2 Apply the concept of inverse Laplace transform of various functions in engineering problems. 3 Expand the periodic function by using Fourier series for real life problems and complex engineering problems. 4 Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory 5 Apply Matrix algebra to solve the engineering problems. 6 Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations
	CEC 302	Mechanics of Solids	1) Evaluate stress - strain behavior of elastic members and thin cylinders subjected to internal pressure 2) Draw variation of axial force, shear force and bending moment diagram for statically determinate beams and frames 3) Calculate Moment of Inertia for cross sections and analyse the material response under the action of shear and the effect of flexure (bending) 4) Predict the angle of twist and shear stress developed in torsion and compute direct and bending stresses developed in the cross section of centrally and eccentrically loaded columns 5) Locate principal planes in members and calculate principal stresses using analytical and graphical method and to calculate strain energy stored in members due to elastic deformation 6) Evaluate slope and deflection of beams supported and loaded in different ways
	CEC 303	Engineering Geology	1) Explain the concepts of Geology and its application for safe, stable and economic design of any civil engineering structure. 2) Interpret the lithological characters of the rock specimen and distinguish them on the basis of studied parameters. 3) Describe the structural elements of the rocks and implement the knowledge for collection and analysis of the geological data. 4) Interpret the geological conditions for the dam site and calculate RQD for the assessment of rock masses. 5) Analyze the given data and suggest rock mass rating for assessment of tunnelling conditions. 6) Interpret the causes of geological hazards and implement the knowledge for their prevention.
	CEC304	Architectural Planning & Design of Buildings	1) Remember and recall the intricate details of building design and drawing. 2) Understand the basic concepts of building design and drawing. 3) Learn how to apply professional ethics and act responsibly pertaining to the norms of building design and drawing practices. 4) Identify, analyze, research literate and solve complex building design and drawing problems. 5) Have new solutions for complex building design and drawing problems. 6) Effectively communicate ideas, related to building design and drawing, both orally as well as in written format like reports & drawings.
	CEC305	Fluid Mechanics - I	1) Describe various properties of fluids and types of flow 2) Determine the pressure difference in pipe flows, application of Continuity equation and Bernoulli's theorem to determine velocity and discharge 3) Apply hydrostatic and dynamic solutions for fluid flow applications 4) Analyse the stability of floating bodies
	CEM 301	Mini Project -1 A	1 Identify problems based on societal /research needs. 2 Apply Knowledge and skill to solve societal problems in a group. 3 Develop interpersonal skills to work as member of a group or leader. 4 Draw the proper inferences from available results through theoretical/ experimental/simulations. 5 Analyse the impact of solutions in societal and environmental context for sustainable development. 6 Use standard norms of engineering practices 7 Excel in written and oral communication 8 Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9 Demonstrate project management principles during project work.
IV	CEC401	Engineering Mathematics - IV	1) Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem & Gauss Divergence theorem 2) Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 3) Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science. 4) Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities 5) Apply the concept of probability distribution to engineering problems& Testing hypothesis of small samples using sampling theory 6) Apply the concepts of parametric and nonparametric tests for analysing practical problems.
	CEC402	Structural Analysis	1 Calculate axial forces in the Coplanartrusses by using Method of joints and method of sections and also calculate radial shear, normal thrust and bending moment in parabolic 3- Hinged arches. 2 Draw Influence Line Diagrams for axial forces in trusses, Reactions, SF and B M in beams and find their values when rolling loads are passing over them 3 Evaluate rotation and displacement at a joint of frames and deflection at any joint of truss and will be able to compute static and kinematic indeterminacy of structure 4 Apply Flexibility methods and make use of Clapeyron's Theorem to analyze the indeterminate structures. 5 Analyse the indeterminate structures such as beams & simple rigid jointed frames using direct stiffness method. 6 Analyse the indeterminate structures using Moment Distribution as Stiffness method and make plastic analysis.
	CEC403	Surveying	1 1 Apply the principles of surveying and field procedures to conduct the various surveys 2 Use various methods for taking linear and angular measurements 3 Collect, record and analyse the field data for preparing drawings 4 Explain the advancements in instruments and methods 5 5 Calculate the area of land and volume of earth work 6 Set out curves

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CE-C504	Building Materials & Concrete Technology	1. To develop and implement the conceptual knowledge of building materials in the construction industry. 2. Assess the properties of building stones and their classifications. Understand the concept of various methods of manufacturing of bricks and different types of concrete blocks. 3. To expose students to various quality control aspects of civil engineering materials by performing different lab tests on materials. 4. Identify the ingredients and properties of fresh and hardened concrete. 5. To interpret and design concrete mix for various grades for various exposure conditions. 6. To study the new technology for manufacturing, testing and quality of concrete.
CE-C505	Fluid Mechanics-II	1. Analyze flow through pipes, various losses through pipes, pipe network and power transmission through nozzle 2. Explain the concept of Laminar flow and velocity distribution through parallel plates and pipes 3. Explain the concept of Turbulent flow and velocity distribution in pipes 4. Describe boundary layer concept , boundary layer separation and flow around submerged bodies 5. Apply Moment of Momentum Principle 6. Explain the importance of dimensionless numbers, dimensional analysis and similarity behavior of model and prototype
CE-M801	Mini Project – 1 B	1) Identify problems based on societal /research needs. 2) Apply Knowledge and skill to solve societal problems in a group. 3) Develop interpersonal skills to work as member of a group or leader. 4) Draw the proper inferences from available results through theoretical/experimental/simulations. 5) Analyse the impact of solutions in societal and environmental context for sustainable development. 6) Use standard norms of engineering practices 7) Excel in written and oral communication. 8) Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9) Demonstrate project management principles during project work.
CE-C501	Structural Analysis – II	• Understand the behavior of various statically indeterminate structures subjected to static loads and variation in temperature. • Analyze the structures using displacement parameters to find out the internal forces such as axial force, shear force, bending moment, twisting moments, etc. for beams, 2D portal frames with various loads and boundary conditions, which becomes the basis for structural design. • Contrast between the concept of force and displacement methods of analysis of indeterminate structures. Also, the elastic curve in beams and frames under the action of loads. • Understand the concept of plastic hinge, plastic moment carrying capacity, shape factor and collapse load for single and multiple span beams. • Find out the approximate dimensions of beams and columns using the approximate method for giving the input in design
CE-C502	Geotechnical Engineering – I	• Understand the soil types, index and engineering properties and relationship between various unit weights & other parameters. • Classify the soil with a view towards assessing the suitability of a given soil for use; either to use if to support a structure (e.g. embankment) or to construct a structure therein (e.g. foundation) • Understand the use of geosynthetics in soil to improve soil properties. • Evaluate the compaction characteristics in laboratory & field and hence interpret the results with compaction specifications. • Interpret soil boring data for foundation design. • Conduct laboratory experiments to collect, analyze, interpret and present the data
CE-C503	Applied Hydraulics	• Apply the concepts of fluid dynamics to solve pipe bend and sprinkler problems. • Analyze dimensional problems and explain model laws. • Explain the working and functions of Francis, Kaplan and Pelton wheel turbines. • Explain the basic concepts of open channel hydraulics and measure discharge through open channels. • Identify the occurrence of hydraulic jump and its parameters • Explain uniform flow, non-uniform flow and establish mathematical relationships.
CE-C504	Environmental Engineering -I	• Understand the water supply system, its components and water demand by various consumers. • Understand and analyze the quality of water and will be able to conduct the quality control test on samples. • Understand the different processes in the water treatment facility. • Design the different units of treatment for water treatment plants. • Understand the components of building water supply system, storage and rain water harvesting. • Understand the problems of air and noise pollution. Besides, they will be prepared to contribute practical solutions to environmental problems in our society.
CE-C505	Transportation Engineering – I	• To get an insight of the development in all the fields of highway engineering and familiarized with different surveys required to be carried out for the implementation of the highway project; to understand the phase of engineering which deals with the planning and geometrics design of streets, highways and abutting land in the context of safe and convenient traffic operations thereon. • To know the required properties of the different materials to be used in the construction of highways and other allied structures, to understand characterization of the materials and to evaluate their suitability; understand the principle of soil stabilization, utilization of geosynthetics in the construction of highway and allied structures • To understand the classification of different types of pavements, factors to be considered in the design of pavements, approaches for designing the different types of pavements and can the flexible and rigid pavements be using IRC Specifications. • To get an insight into the methods of construction of different types of pavements; along with the importance of highway drainage and various methods of providing the drainage; also, to understand the elements of bridge engineering.
CE-[illegible]	Building Services and Repairs	• Understand the importance & installation of utility services. • Understand the drawbacks if all the service lines are not installed properly or if materials used are faulty. • Choose appropriate systems & integrate the same into the building construction projects. • Assess the structural health of the buildings & infrastructural works and also Inspect & evaluate the damaged structures. • Implement the techniques for repairing the concrete structures and also decide whether or not the structure should be dismantled, if it is deteriorated beyond repair. • Employ the methods of steel protection in the field.
CE-C507	Business and Communication Ethics	• Design a technical document using precise language, suitable vocabulary and apt style. • Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships. • Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities. • Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP. • Deliver formal presentations effectively implementing the verbal and non-verbal skills.

VI	CE-C601	Geotechnical Engineering-II	• Students will be able to evaluate the consolidation parameters for the soil. • Students will be able to calculate the shear strength parameters for the soil. • Students will be able to calculate the factors of safety of different types of slopes under various soil conditions, analyze the stability of slopes, calculate lateral earth pressures and analyse the stability of retaining walls. • Students will be able to calculate bearing capacity of shallow foundations using theoretical and field methods, calculate load bearing capacity of individual as well as group of pile foundations and their settlement using theoretical and field methods • Students will be able to explain conduits and calculate the load carried by the struts of a braced cut under various soil conditions. • Students will be able to explain ground improvement techniques.
	CE-C602	Design and Drawing of Steel Structures	• Explain the Limit State Design philosophy as applied to steel structures. • Predict the behavior and design members subjected to axial compression, tension and their connection. • Predict the behavior and design members subjected to bending, shear and their connection • Calculate loading for a truss and design the complete truss. • Demonstrate ability to follow IS codes, design tables and aids in analysis and design steel structures. • Analyze and design the commercial steel structures and prepare drawing with complete detailing.
	CE-C603	Transportation Engineering- II	• Understand the various systems of railway, airport, water transportation and the components of p- way and its construction, yards, modernization of railway track. • Apply the concept of geometric design of railway track and railway traffic control. • Understand airport planning, obstructions and orientation of runway. • Apply the concept of geometric design of runway, taxiway, etc. and the knowledge of various signaling system for air traffic control. • Understand the system of water transportation, types of breakwater, harbours and port facilities equipment • Understand the basic idea about the bridge engineering
	CE-C604	Environmental Engineering-II	• Explain wastewater collection systems in buildings and municipal areas and to determine the quantity of wastewater and storm water production. Also, gain the knowledge of the construction of new sewer line and importance of sewer appurtenances. • Explain and analyze the characteristics of wastewater and design the primary treatment for wastewater • Explain on-site treatment methods and solve Analyze and design wastewater treatment systems (ASP, Aerated lagoon and Oxidation ponds). • Identify and apply proper treatment for reclamation and reuse of wastewater and disposal. • Explain sludge characteristics and processing methods. • To provide knowledge of solid waste collection system, characteristics of solid waste and to identify hazardous waste. Study related to plastic waste management will be studied.
	CE-C605	Water Resource Engineering-I	• Classify various types of irrigation projects • Explain different irrigation methods and effective use of water resources. • Calculate the crop water requirements and irrigation requirement • Derive hydrographs and calculate runoff of a catchment area. • Explain the steady state and unsteady state conditions of any aquifer and design water wells. • Estimate the capacity of a reservoir for different purposes.
	CE-DLO6061	Advanced Construction Equipment	• Understand the use/applications of various conventional construction equipment and select the best out of them for a particular site requirement. • Know modern methods/equipment used for underground as well as underwater tunnelling. • Compare conventional and modern methods of formwork on the basis of productivity, reuse value, ease of erection and dismantling, flexibility offered and overall cost. • Understand the techniques involved and the equipment required thereof for construction of various transporting facilities. • Gain knowledge about the setting up of different kinds of the power generating structures. • Select proper equipment for construction of transporting facilities based on requirements.
	CE-C607	Software Applications in Civil Engineering	• Explain the use of software in various disciplines of Civil Engineering • Demonstrate the ability to use the software in chosen field and provide solutions to field problems • Validate the software results using judgment about range of answers. • Identify the software application in particular field of Civil Engineering • Identify open source software used in case of specific problems. • Apply Independently different software's for specific problems
VII	CE-C701	Quantity Survey Estimation and Valuation	• Apply the measurement systems to various civil engineering items of work. • Draft the specifications for various items of work & determine unit rates of items of works • Estimate approximate cost of the structures by using various methods & prepare detailed estimates of various civil engineering structures by referring drawings. • Assess the quantities of earthwork &construct mass haul diagrams. • Draft tender notice &demonstrate the significance of the tender as well as contract process. • Determine the present fair value of any constructed building at stated time.
	CE-C702	Theory of Reinforced Concrete Structures	• Understand the pros and cons of the WSM and LSM. • Understand the various clauses specified in IS: 456-2000 for designing structural members with the safety and economy. • Carry out analysis and design of various elements of the reinforced concrete structures such as beam, slab, column, footings using the concept of Limit state method. • Understand and the use of readymade design curves from Special publications of Bureau of Indian standards.
	CE-C703	Water Resource Engineering-II	• Design the section of gravity dams, earth and rockfill dams, arch dams and buttress dams. • Design spillways and energy dissipaters. • Apply silt theories to design irrigation canals. • Explain various types of canals and its maintenance. • Explain different cross drainage works of a canal system.
	CE-DLO7042	Solid Waste Management	• Explain generation, storage, collection, transfer and transport, processing, recovery and disposal in the management of solid waste. • Understand the characteristics of different types of solid waste and the factors affecting variation. • Identify the methods of collection, storage and transportation of solid waste. • Suggest suitable technical solutions for processing of wastes. • Ability to plan waste minimization and disposal of municipal solid waste. • Ensure the safe handling and treatment of Hazardous, Electronic and Biomedical waste.

	CE-C ILOC7017	Disaster Management and Mitigation Measures	• Get to know natural as well as manmade disaster and their extent and possible effects on the economy. • Plan of national importance structures based upon the previous history. • Get acquainted with government policies, acts and various organizational structure associated with an emergency. • Get to know the simple do's and don'ts in such extreme events and act accordingly.
VIII	CE-C801	Design and Drawing of Reinforced Concrete Structures	• Design independently RCC structure by applying IS code provisions. • Design staircase, water tank and retaining wall. • Explain principles of PSC and calculate losses. • Draw and explain the structural detailing. • Explain response of structure during an earthquake and calculate design forces.
	CE-C802	Construction Management	• Understand & apply the knowledge of management functions like planning, scheduling, executing & controlling the construction projects. • Prepare feasible project schedule by using various scheduling techniques. • Gain knowledge of managing various resources &recommend best method of allocating the resources to the project. • develop optimum relationship between time & cost for construction project • Implement quality & safety measures on construction sites during execution of civil engineering projects. • Understand the importance of labour legislation
	CE-DLO8032	Industrial Waste Treatment	• Understand the characteristics of industrial wastewater. • Identify sampling method and analyze industrial waste. • Design facilities for the processing and reclamation of industrial waste water. • Explain on-site treatment methods and solve Analyze and design wastewater treatment systems. (floatation, vacuum filtration, centrifugation, filter press and membrane filters) • Detailed on-site manufacturing processes and treatments of industrial waste water. • Analyze proposed development project plans for possible environmental effects and to improve treated effluent quality to confirm standard prescribed by regulatory agencies.
	CE-C ILOC8028	Environment Management	• Understand the concept of environmental management • Understand ecosystem and interdependence, food chain etc. • Understand and interpret environment related legislations

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Boisar (East), Tal. & Dist. Palghar-401 501

Theem College of Engineering

COURSE OUTCOMES (COs)

Department of Information Technology Engineering

SEM	Course Code	Course Name	Course Outcomes
III	ITC301	Engineering Mathematics-III	1. Apply the concept of Laplace transform to solve the real integrals in engineering problems. 2. Apply the concept of inverse Laplace transform of various functions in engineering problems. 3. Expand the periodic function by using Fourier series for real life problems and complex engineering problems. 4. Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory. 5. Apply the concept of Correlation and Regression to the engineering problems in data science, machine learning and AI. 6. Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
	ITC302	Data Structure and Analysis	1. Classify and Apply the concepts of stacks, queues and linked list in real life problem solving. 2. Classify, apply and analyze the concepts trees in real life problem solving. 3. Illustrate and justify the concepts of graphs in real life problem solving. 4. List and examine the concepts of sorting, searching techniques in real life problem solving. 5. Use and identify the concepts of recursion, hashing in real life problem solving. 6. Examine and justify different methods of stacks, queues, linked list, trees and graphs to various applications.
	ITC303	Database Management System	1 Identify the need of Database Management System. 2 Design conceptual model for real life applications. 3 Create Relational Model for real life applications 4 Formulate query using SQL commands. 5 Apply the concept of normalization to relational database design. 6 Demonstrate the concept of transaction, concurrency and recovery.
	ITC304	Principle of Communication	1 Describe analog and digital communication systems. 2 Differentiate types of noise, analyses the Fourier transform of time and frequency domain. 3 Design transmitter and receiver of AM, DSB, SSB and FM. 4 Describe Sampling theorem and pulse modulation systems. 5 Explain multiplexing and digital band pass modulation techniques. 6 Describe electromagnetic radiation and propagation of waves.
	ITC305	Paradigms and Computer Programming Fundamentals	1 Understand and Compare different programming paradigms. 2 Understand the Object Oriented Constructs and use them in program design. 3 Understand the concepts of declarative programming paradigms through functional and logic programming. 4 Design and Develop programs based on declarative programming paradigm using functional and/or logic programming. 5 Understand the role of concurrency in parallel and distributed programming. 6 Understand different application domains for use of scripting languages.
	ITL301	Data Structure Lab	1 Understand and use the basic concepts and principles of various linked lists, stacks and queues. 2 Understand the concepts and apply the methods in basic trees. 3 Use and identify the methods in advanced trees. 4 Understand the concepts and apply the methods in graphs. 5 Understand the concepts and apply the techniques of searching, hashing and sorting 6 Illustrate and examine the methods of linked lists, stacks, queues, trees and graphs to various real time problems
	ITL302	SQL Lab	1 Define problem statement and Construct the conceptual model for real life application. 2 Create and populate a RDBMS using SQL. 3 Formulate and write SQL queries for efficient information retrieval 4 Apply view, triggers and procedures to demonstrate specific event handling. 5 Demonstrate database connectivity using JDBC. 6 Demonstrate the concept of concurrent transactions.
	ITL303	Computer programming Paradigms Lab	1 Implement Object Oriented concepts in C++. 2 Design and Develop solution based on declarative programming paradigm using functional and logic programming. 3 Understand the multi threaded programs in Java and C++ 4 Understand the need and use of exception handling and garbage collection in C++ and JAVA 5 Implement a solution to the same problem using multiple paradigms. 6 Compare the implementations in multiple paradigms at coding and execution level.
	ITL304	Java Lab (SBL)	1 Explain the fundamental concepts of Java Programing. 2 Use the concepts of classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem. 3 Demonstrate how to extend java classes and achieve reusability using Inheritance, Interface and Packages. 4 Construct robust and faster programmed solutions to problems using concept of Multithreading, exceptions and file handling
	ITM301	Mini Project – 1 A for Front end /backend Application using JAVA	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	ITC401	Engineering Mathematics-IV	1 Apply the concepts of eigen values and eigen vectors to solve engineering problems. 2 Illustrate the use of concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 3 Apply the concept of Z- transformation and its inverse in engineering problems. 4 Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory. 5 Apply the concept of Linear Programming to solve the optimization problems 6 Use the Non-Linear Programming techniques to solve the optimization problems.

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IV	ITC402	Computer Network and Network Design	1 Describe the functionalities of each layer of the models and compare the Models. 2 Categorize the types of transmission media and explain data link layer concepts, design issues and protocols. 3 Analyze the routing protocols and assign IP address to networks. 4 Explain the data transportation and session management issues and related protocols used for end to end delivery of data. 5 List the data presentation techniques and illustrate the client/server model in application layer protocols. 6 Use of networking concepts of IP address, Routing, and application services to design a network for an organization
	ITC403	Operating System	1 Understand the basic concepts related to Operating System. 2 Describe the process management policies and illustrate scheduling of processes by CPU. 3 Explain and apply synchronization primitives and evaluate deadlock conditionsas handled by Operating System. 4 Describe and analyze the memory allocation and management functions of Operating System. 5 Analyze and evaluate the services provided by Operating System for storage management. 6 Compare the functions of various special-purpose Operating Systems.
	ITC404	Automata Theory	1 Explain, analyze and design Regular languages, Expression and Grammars. 2 Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator. 3 Analyze and design Context Free languages and Grammars. 4 Design different types of Push down Automata as Simple Parser. 5 Design different types of Turing Machines as Acceptor, Verifier, Translator and Basic computing machine. 6 Develop understanding of applications of various Automata.
	ITC405	Computer Organization and Architecture	1 Demonstrate the fundamentals of Digital Logic Design 2 Describe basic organization of computer, the architecture of 8086 microprocessor and implement assembly language programming for 8086 microprocessors. 3 Demonstrate control unit operations and conceptualize instruction level parallelism. 4 List and Identify integers and real numbers and perform computer arithmetic operations on integers. 5 Categorize memory organization and explain the function of each element of a memory hierarchy. 6 Examine different methods for computer I/O mechanism
	ITL401	Network Lab	1 Execute and evaluate network administration commands and demonstrate their use in different network scenarios. 2 Demonstrate the installation and configuration of network simulator. 3 Demonstrate and measure different network scenarios and their performance behavior. 4 Implement the socket programming for client server architecture. 5 Analyze the traffic flow of different protocols. 6 Design a network for an organization using a network design tool.
	ITL402	Unix Lab	1 Understand the architecture and functioning of Unix 2 Identify the Unix general purpose commands 3 Apply Unix commands for system administrative tasks such as file system management and user management. 4 Execute Unix commands for system administrative tasks such as process management and memory management 5 Implement basic shell scripts for different applications. 6 Implement advanced scripts using awk & perl languages and grep, sed, etc. commandsfor performing various tasks.
	ITL403	Microprocessor Lab	1 Demonstrate various components and peripheral of computer system 2 Analyze and design combinational circuits 3 Build a program on a microprocessor using arithmetic & logical instruction set of 8086. 4 Develop the assembly level programming using 8086 loop instruction set 5 Write programs based on string and procedure for 8086 microprocessor. 6 Design interfacing of peripheral devices with 8086 microprocessor.
	ITL404	Python Lab (SBL)	1 Understand the structure, syntax, and semantics of the Python language. 2 Interpret advanced data types and functions in python 3 illustrate the concepts of object-oriented programming as used in Python 4 Create Python applications using modules, packages, multithreading and exception handling. 5 Gain proficiency in writing File Handling programs ,also create GUI applications and evaluate database operations in python. 6 Design and Develop cost-effective robust applications using the latest Python trends and technologies
	ITM401	Mini Project – 1 B for Python based automation projects	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	ITC501	Internet Programming	1 Select protocols or technologies required for various web applications. 2 Apply JavaScript to add functionality to web pages. 3 Design front end application using basic React. 4 Design front end applications using functional components of React. 5 Design back-end applications using Node.js. 6 Construct web based Node.js applications using Express.
	ITC502	Computer Network Security	1 Explain the fundamentals concepts of computer security and network security. 2 Identify the basic cryptographic techniques using classical and block encryption methods. 3 Study and describe the system security malicious software. 4 Describe the Network layer security, Transport layer security and application layer security. 5 Explain the need of network management security and illustrate the need for NAC. 6 Identify the function of an IDS and firewall for the system security.
	ITC503	Entrepreneurship and E-business	1 Understand the concept of entrepreneurship and its close relationship with enterprise and owner-management. 2 Understand the nature of business development in the context of existing organizations and of new business start-ups 3 Comprehended important factors for starting a new venture and business development. 4 Know issues and decisions involved in financing and resourcing a business start-up 5 Describe various E-business Models 6 Discuss various E-business Strategies.
	ITC504	Software Engineering	1 Understand and use basic knowledge in software engineering. 2 Identify requirements, analyze and prepare models. 3 Plan, schedule and track the progress of the projects. 4 Design & develop the software solutions for the growth of society 5 To demonstrate and evaluate real time projects with respect to software engineering principles 6 Apply testing and assure quality in software solution

V	ITL505	Professional Communication & Ethics-II (PCE-II)	1. plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles. 2. strategize their personal and professional skills to build a professional image and meet the demands of the industry. 3. emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations. 4. deliver persuasive and professional presentations. 5.develop creative thinking and interpersonal skills required for effective professional communication. 6. apply codes of ethical conduct, personal integrity and norms of organizational behaviour.
	ITDO5012	Advance Data Management Technologies	1.Measure query costs and design alternate efficient paths for query execution. 2 Apply sophisticated access protocols to control access to the database. 3 Implement Distributed databases4 Organize strategic data in an enterprise and build a data Warehouse. 5 Analyse data using OLAP operations so as to take strategic decisions. 6 Design modern applications using NoSQL databases.databases.
	ITL501	IP Lab	1 Identify and apply the appropriate HTML tags to develop a webpage. 2 Identify and apply the appropriate CSS tags to format data on webpage 3 Construct responsive websites using Bootstrap 4 Use JavaScript to develop interactive web pages. 5 Construct front end applications using React 6 Construct back end applications using Node.js/Express
	ITL502	Security Lab	1 Illustrate symmetric cryptography by implementing classical ciphers. 2 Demonstrate Key management, distribution and user authentication. 3 Explore the different network reconnaissance tools to gather information about networks 4 Use tools like sniffers, port scanners and other related tools for analyzing packets in a network. 5 Use open-source tools to scan the network for vulnerabilities and simulate attacks. 6 Demonstrate the network security system using open source tools.
	ITL503	DevOPs Lab	1 To understand the fundamentals of DevOps engineering and be fully proficient with DevOps terminologies, concepts, benefits, and deployment options to meet your business requirements 2 To obtain complete knowledge of the "version control system" to effectively track changes augmented with Git and GitHub 3 To understand the importance of Jenkins to Build and deploy Software Applications on server environment 4 Understand the importance of Selenium and Jenkins to test Software Applications 5 To understand concept of containerization and Analyze the Containerization of OS images and deployment of applications over Docker 6 To Synthesize software configuration and provisioning using Ansible.
	ITL504	Advance DevOps Lab	1 To understand the fundamentals of Cloud Computing and be fully proficient with Cloud based DevOps solution deployment options to meet your business requirements 2 To deploy single and multiple container applications and manage application deployments with rollouts in Kubernetes 3 To apply best practices for managing infrastructure as code environments and use terraform to define and deploy cloud infrastructure 4 To identify and remediate application vulnerabilities earlier and help integrate security in the development process using SAST Techniques. 5 To use Continuous Monitoring Tools to resolve any system errors (low memory, unreachable server etc.) before they have any negative impact on the business productivity 6 To engineer a composition of nano services using AWS Lambda and Step Functions with the Serverless Framework
	ITM501	Mini Project – 2 A Web Based Business Model	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	ITC601	Data Mining & Business Intelligence	1 Demonstrate an understanding of the importance of data warehousing and data mining and the principles of business intelligence. 2 Organize and prepare the data needed for data mining using pre preprocessing techniques. 3 Perform exploratory analysis of the data to be used for mining. 4 Implement the appropriate data mining methods like classification, clustering or Frequent Pattern mining on large data sets. 5 Define and apply metrics to measure the performance of various data mining lgorithms. 6 Apply BI to solve practical problems: Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support.
	ITC602	Web X.0	1 Understand the basic concepts related to web analytics and semantic web. 2 Understand how TypeScript can help you eliminate bugs in your code and enable you to scale your code. 3 Understand AngularJS framework and build dynamic, responsive single-page web applications. 4 Apply MongoDB for frontend and backend connectivity using REST API. 5 Apply Flask web development framework to build web applications with less code 6 Develop Rich Internet Application using proper choice of Framework.
	ITC603	Wireless Technology	1 Describe the basic concepts of Wireless Network and Wireless Generations. 2 Demonstrate and Evaluate the various Wide Area Wireless Technologies. 3 Analyze the prevalent IEEE standards used for implementation of WLAN and WMAN Technologies 4 Appraise the importance of WPAN, WSN and Ad-hoc Networks. 5 Analyze various Wireless Network Security Standards. 6 Review the design considerations for deploying the Wireless Network Infrastructure
	ITC604	AI and DS - 1	1 Develop a basic understanding of the building blocks of AI as presented in terms of intelligent agents. 2 Apply an appropriate problem-solving method and knowledge-representation scheme. 3 Develop an ability to analyze and formalize the problem (as a state space, graph, etc.). They will be able to evaluate and select the appropriate search method. 4 Apply problem solving concepts with data science and will be able to tackle them from a statistical perspective. 5 Choose and apply appropriately from a wider range of exploratory and inferential methods for analyzing data and will be able to evaluate and interpret the results contextually. 6 Understand and apply types of machine learning methods for real world problems

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VI	ITDO6014	Ethical Hacking and Forensics	1 Define the concept of ethical hacking. 2 Recognize the need of digital forensics and define the concept of digital evidence and incident response. 3 Apply the knowledge of computer forensics using different tools and techniques. 4 Detect the network attacks and analyze the evidence. 5 Apply the knowledge of computer forensics using different tools and techniques. 6 List the method to generate legal evidence and supporting investigation reports
	ITL601	Business Intelligence Lab	1 Identify sources of Data for mining and perform data exploration 2 Organize and prepare the data needed for data mining algorithms in terms of attributes and class inputs, training, validating, and testing files 3 Implement the appropriate data mining methods like classification, clustering or association mining on large data sets using open-source tools like WEKA 4 Implement various data mining algorithms from scratch using languages like Python/ Java etc. 5 Evaluate and compare performance of some available BI packages 6 Apply BI to solve practical problems: Analyze the problem domain, use the data collected in enterprise apply the appropriate data mining technique, interpret and visualize the results and provide decision support
	ITL602	Web Lab	1 Understand open source tools for web analytics and semantic web apps development and deployment. L1, L2 2 Understand the basic concepts of TypeScript for designing web applications. L1, L2, L3 3 Implement Single Page Applications using AngularJS Framework 4 Develop Rich Internet Applications using AJAX. L1, L2, L3 5 Create REST Web services using MongoDB. L1, L2, L3, L4 6 Design web applications using Flask.
	ITL603	Sensor Lab	1 Differentiate between various wireless communication technologies based on the range of communication, cost, propagation delay, power and throughput. 2 Conduct a literature survey of sensors used in real world wireless applications. 3 Demonstrate the simulation of WSN using the Network Simulators (Contiki/ Tinker CAD/ Cup carbon etc). 4 Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing 5 Report and present the findings of the study conducted in the preferred domain. 6 Demonstrate the ability to work in teams and manage the conduct of the research study.
	ITL604	MAD & PWA Lab	1 Understand cross platform mobile application development using Flutter framework 2 Design and Develop interactive Flutter App by using widgets, layouts, gestures and animation 3 Analyze and Build production ready Flutter App by incorporating backend services and deploying on Android / iOS 4 Understand various PWA frameworks and their requirements 5 Design and Develop a responsive User Interface by applying PWA Design techniques 6 Develop and Analyse PWA Features and deploy it over app hosting solutions
	ITL605	DS using Python Lab	1 Understand the concept of Data science process and associated terminologies to solve real-world problems 2 Analyze the data using different statistical techniques and visualize the outcome using different types of plots. 3 Analyze and apply the supervised machine learning techniques like Classification, Regression or Support Vector Machine on data for building the models of data and solve the problems. 4 Apply the different unsupervised machine learning algorithms like Clustering, Decision Trees, Random Forests or Association to solve the problems. 5 Design and Build an application that performs exploratory data analysis using Apache Spark 6 Design and develop a data science application that can have data acquisition, processing, visualization and statistical analysis methods with supported machine learning technique to solve the real-world problem.
	ITM601	Mini Project – 2 B Web Based on ML	10. Identify problems based on societal /research needs. 11. Apply Knowledge and skill to solve societal problems in a group. 12. Develop interpersonal skills to work as member of a group or leader. 13. Draw the proper inferences from available results through theoretical/ experimental/simulations. 14. Analyse the impact of solutions in societal and environmental context for sustainable development. 15. Use standard norms of engineering practices 16. Excel in written and oral communication. 17. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 18. Demonstrate project management principles during project work.
	ITC701	AI and DS –II	1 Design models for reasoning with uncertainty as well as the use of unreliable information. 2 Analyze the process of building a Cognitive application. 3 Design fuzzy controller system. 4 Apply learning concepts todevelop real-lifee applications. 5 Evaluateth performance of learning algorithms. 6 Analyze current trends in Data Science.
	ITC702	Internet of Everything	1 Describe the Characteristics and Conceptual Framework of IoT. 2 Differentiate between the levels of the IoT architectures. 3 Analyze the IoT access technologies. 4 Illustrate various edge to cloud protocol for IoT. 5 Apply IoT analytics and data visualization. 6 Analyze and evaluate IoT applications.
	ITL701	Data Science Lab	1 Implement reasoning with uncertainty. 2 Explore use cases of Cognitive Computing 3 Implement a fuzzy controller system. 4 Develop real-life applications using learning concepts. 5 Evaluate the performance of applications. 6 Implement and analyze applications based on current trends in Data Science.
	ITL702	Internet of Everything Lab	1 Identify the requirements for the real-world problems. 2 Conduct a survey of several available literature in the preferred field of study. 3 Study and enhance software/ hardware skills. 4 Demonstrate and build the project successfully by hardware/sensor requirements, coding, emulating and testing. 5 To report and present the findings of the study conducted in the preferred domain. 6 Demonstrate an ability to work in teams and manage the conduct of the research study.
	ITL703	Secure Application Development	1 Apply secure programming of application code. 2 Understand the Owasp methodologies and standards. 3 Identify main vulnerabilities inherent in applications. 4 Apply Data Validation and Authentication for application 5 Apply Security at Session Layer Management 6 Apply secure coding for cryptography.

VII	ITL704	Recent Open Source Project Lab	1 Understand and apply the basic concepts of Open Source Software. 2 Identify the difference between the GPL (General Public Licence) and Contribute to Open Source. 3Apply and evaluate your knowledge for the Contribute to Open Source in different Operating System. 4Apply and evaluate your knowledge for the Contribute to Open Source in different Technologies. 5Apply and evaluate your knowledge for the Contribute to Open Source in different Network Management. 6Apply and evaluate your knowledge for the Contribute to Open Source in different Applications and Services.
	ITM701	Major Project – I	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	ITDO7014	Software Testing and QA	1 Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs. 2 Understand various software testing methods and strategies. 3 Manage the testing process and testing metrics. 4 Understand fundamental concepts of software automation and use automation tools. 5 Apply the software testing techniques in the real time environment. 6 Use practical knowledge of a variety of ways to test software and quality attributes.
	ITDO7024	Information Retrieval System	1 Define and describe the objectives of the basic concepts of the Information retrieval system. 2 Evaluate the taxonomy of different information retrieval models. 3 Try to solve and process text and multimedia retrieval queries and their operations. 4 Evaluate text processing techniques and operations in the information retrieval system. 5 Demonstrate and evaluate various indexing and searching techniques. 6 Design the user interface for an information retrieval system.
	ILO7016	Cyber Security and Laws	1. Understand the concept of cybercrime and its effect on outside world 2. Interpret and apply IT law in various legal issues 3. Distinguish different aspects of cyber law 4. Apply Information Security Standards compliance during software design and development
VIII	ITC801	Blockchain and DLT	1 Describe the basic concept of Blockchain and Distributed Ledger Technology. 2 Interpret the knowledge of the Bitcoin network, nodes, keys, wallets and transactions 3 Implement smart contracts in Ethereum using different development frameworks. 4 Develop applications in permissioned Hyperledger Fabric network. 5 Interpret different Crypto assets and Crypto currencies 6 Analyze the use of Blockchain with AI, IoT and Cyber Security using case studies.
	ITL801	Blockchain Lab	1 Develop and test smart contract on local Blockchain. 2 Develop and test smart contract on Ethereum test networks. 3 Write and deploy smart contract using Remix IDE and Metamask. 4 Design and develop Cryptocurrency. 5 Write and deploy chain code in Hyperledger Fabric. 6 Develop and test a Full-fledged DApp using Ethereum/Hyperledger.
	ITL802	Cloud Computing	1 Implement different types of virtualization techniques. 2 Analyze various cloud computing service models and implement them to solve the given problems. 3 Design and develop real world web applications and deploy them on commercialcloud(s). 4 Explain major security issues in the cloud and mechanisms to address them. 5 Explore various commercially available cloud services and recommend the appropriate one for the given application. 6 Implement the concept of containerization.
	ITM701	Major Project – II	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
	ITDO8011	Big Data Analytics	1 Explain the motivation for big data systems and identify the main sources of Big Data in the real world. 2 Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store, retrieve and process Big Data for Analytics. 3 Implement several Data Intensive tasks using the Map Reduce Paradigm. 4 Apply several newer algorithms for Clustering Classifying and finding associations in Big Data. 5 Design algorithms to analyze Big data like streams, Web Graphs and Social Media data. 6 Design and implement successful Recommendation engines for enterprises.
	TDO8024	Cloud Computing and Services	1 Explain the basics concepts of cloud computing like service models, deployment models and its architecture. 2 Describe and apply virtualization in cloud computing. 3 Use and Analyze different cloud computing services. 4 Understand and apply various services provided by Amazon Web Services cloud platform. 5 Discuss the functionality of Openstack cloud platform & Severless computing. 6 Recognize and examine the security and privacy concerns in cloud computing.
	ILO8018	Digital Business Management	1. Identify drivers of digital business 2. Illustrate various approaches and techniques for E-business and management 3. Prepare E-business plan

THEEM COLLEGE OF ENGINEERING BOISAR

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THEEM COLLEGE OF ENGINEERING
Boisar (East), Tal. & Dist. Palghar-401 501.

Theem College of Engineering

COURSE OUTCOMES (COs)

*Department of **Mechanical** Engineering*

SEM	Course Code	Course Name	Course Outcomes
III	MEC301	Engineering Mathematics III	1. Apply the concept of Laplace transform to solve the real integrals in engineering problems. 2. Apply the concept of inverse Laplace transform of various functions in engineering problems. 3. Expand the periodic function by using Fourier series for real life problems and complex engineering problems. 4. Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory. 5. Apply Matrix algebra to solve the engineering problems. 6. Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations.
	MEC302	Strength of Materials	1. Demonstrate fundamental knowledge about various types of loading and stresses induced. 2. Draw the SFD and BMD for different types of loads and support conditions. 3. Analyse the bending and shear stresses induced in beam. 4. Analyse the deflection in beams and stresses in shaft. 5. Analyse the stresses and deflection in beams and Estimate the strain energy in mechanical elements. 6. Analyse buckling phenomenon in columns.
	MEC303	Production Processes	1. Demonstrate an understanding of casting process 2. Illustrate principles of forming processes. 3. Demonstrate applications of various types of welding processes. 4. Differentiate chip forming processes such as turning, milling, drilling, etc. 5. Illustrate the concept of producing polymer components and ceramic components. 6. Illustrate principles and working of non-traditional manufacturing. 7. Understand the manufacturing technologies enabling Industry 4.0
	MEC304	Materials and Metallurgy	1. Identify the various classes of materials and comprehend their properties. 2. Apply phase diagram concepts to engineering applications. 3. Apply particular heat treatment for required property development. 4. Identify the probable mode of failure in materials and suggest measures to prevent them. 5. Choose or develop new materials for better performance. 6. Decide an appropriate method to evaluate different components in service.
	MEC305	Thermodynamics	1. Demonstrate application of the laws of thermodynamics to a wide range ofsystems. 2. Compute heat and work interactions in thermodynamicsystems. 3. Demonstrate the interrelations between thermodynamic functions to solve practicalproblems. 4. Compute thermodynamicinteractions using the steam table and Mollier chart. 5. Compute efficiencies of heat engines, power cycles. 6. Apply the fundamentals of compressible fluid flow to the relevant systems.
	MEP305L301	Mini Project – 1 A	1. Identify problems based on societal research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices. 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
IV	MEC401	Engineering Mathematics IV	1. Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem & Gauss Divergence theorem. 2. Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 3. Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science. 4. Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities. 5. Apply the concept of probability distribution to engineering problems & testing hypothesis of small samples using sampling theory. 6. Apply the concepts of parametric and nonparametric tests for analyzing practical problems.
	MEC402	Fluid Mechanics	1. Define properties of fluids, classify fluids and evaluate hydrostatic forces on various surfaces. 2. Illustrate understanding ofdimensional analysis of Thermal and Fluid systems. 3. Differentiate velocity potential function and stream function and solve for velocity and acceleration of a fluid at a given location in a fluid flow. 4. Formulate and solve equations of the control volume for fluid flow systems and Apply Bernoulli's equation to various flow measuring
	MEC403	Kinematics of Machinery	1. Identify various components of mechanisms 2. Develop mechanisms to provide specific motion 3. Draw velocity and acceleration diagrams of various mechanisms 4. Choose a cam profile for the specific follower motion 5. Predict condition for maximum power transmission in the case of a belt drive 6. Illustrate requirements for an interference-free gear pair
	MEC404	CAD/CAM	1. Identify suitable computer graphics techniques for 3D modeling. 2. Transform, manipulate objects & store and manage data. 3. Develop 3D model using various types of available biomedical data. 4. Create the CAM Toolpath for specific given operations. 5. Build and create data for 3D printing of any given object using rapid prototyping and tooling processes. 6. Illustrate understanding of various cost effective alternatives for manufacturing products.
	MEC405	Industrial Electronics	1. Illustrate construction, working principles and applications of power electronic switches. 2. Identify rectifiers and inverters for dc and ac motor speed control. 3. Develop circuits using OPAMP and Timer IC 555. 4. Identify digital circuits for industrial applications. 5. Demonstrate the knowledge of basic functioning of microcontrollers. 6. Analyze speed-torque characteristics of electrical machines for speed control.

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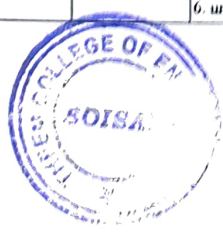
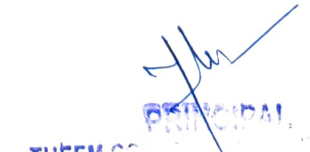
	MEPBL401	Mini Project – 1 B	1. Identify problems based on societal /research needs 2. Apply Knowledge and skill to solve societal problems in a group 3. Develop interpersonal skills to work as member of a group or leader 4. Draw the proper inferences from available results through theoretical/ experimental/simulations 5. Analyse the impact of solutions in societal and environmental context for sustainable development 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning 9. Demonstrate project management principles during project work
V	MEC501	Mechanical Measurements and Controls	1. Handle, operate and apply the precision measuring instruments / equipment's 2. Analyse simple machined components for dimensional stability & functionality 3. Classify various types of static characteristics and types of errors occurring in the system 4. Classify and select proper measuring instrument for displacement, pressure, flow and temperature measurements 5. Design mathematical model of system/process for standard input responses and analyse error and differentiate various types of control systems and time domain specifications 6. Analyse the problems associated with stability.
	MEC502	Thermal Engineering	1. Analyze the three modes of heat transfer in engineering application. 2. Develop mathematical models for different modes of heat transfer. 3. Analyze performance parameters of different types of heat exchangers. 4. Identify and analyze the Transient heat Transfer in engineering applications. 5. Explain construction and working of different components of internal combustion engines. 6. Evaluate engine performance and emission characteristics.
	MEC503	Dynamics of Machinery	1. Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems 2. Illustrate basic of static and dynamic forces 3. Determine natural frequency of element/system 4. Determine vibration response of mechanical elements / systems 5. Design vibration isolation system for a specific application 6. Demonstrate basic concepts of balancing of forces and couples
	MEC504	Finite Element Analysis	1. Solve differential equations using weighted residual methods. 2. Develop the finite element equations to model engineering problems governed by second order differential equations. 3. Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements. 4. Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements. 5. Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system. 6. Use commercial FEA software, to solve problems related to mechanical engineering.
	MEDLO5011	Optimization Techniques	1. Identify the types of optimization problems and apply the calculus method to single variable problems. 2. Formulate the problem as Linear Programming problem and analyse the sensitivity of a decision variable. 3. Apply various linear and non-linear techniques for problem solving in various domain. 4. Apply multi-objective decision making methods for problem in manufacturing environment and other domain. 5. Apply multi criterion decision making methods for problem in manufacturing environment and other domain. 6. Apply Design of Experiments method for Optimization
	MEPBL501	Mini Project - 2A	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
VI	MEC601	Machine Design	1. Use design data book/standard codes to standardise the designed dimensions 2. Design Knuckle Joint, cotter joint and Screw Jack 3. Design shaft under various conditions and couplings 4. Select bearings for a given applications from the manufacturers catalogue. 5. Select and/or design belts and flywheel for given applications 6. Design springs, clutches and brakes
	MEC602	Turbo Machinery	1. Define various parameters associated with steam generators and turbo machines. 2. Identify various components and mountings of steam generators with their significance. 3. Identify various turbo machines and explain their significance. 4. Apply principles of thermodynamics and fluid mechanics to estimate various parameters like mass flow rate power, torque, efficiency, temperature, etc. 5. Evaluate performance of SG and Turbo machines and apply various techniques to enhance performance.
	MEC603	Heating,Ventilation,Air Conditioning and Refrigeration	1. Illustrate the fundamental principles and applications of refrigeration and air conditioning systems. 2. Identify various HVAC&R components 3. .Evaluate performance of various refrigeration system 4. E stimat e cooling and heating loads for an airconditioning system. 5. Select air handling unit & design air distribution system 6. Apply the knowledge of HVAC for the sustainable development of refrigeration and airconditioning systems.
	MEC604	Automation and Artificial Intelligence	1. Demonstrate understanding of fundamentals of industrial automation and AI 2. Design & develop pneumatic / hydraulic circuits 3. Design and develop electropneumatic circuits and PLC ladder logics 4. Demonstrate understanding of robotic control systems and their applications. 5. Demonstrate understanding of various AI and machine learning technologies.
	MEDLO6021	Press Tool Design	1. Demonstrate various press working operations for mass production of sheet metal parts 2. Identify press tool requirements to build concepts pertaining to design of press tools 3. Prepare working drawings and setup for economic production of sheet metal components 4. Select suitable materials for different elements of press tools 5. Illustrate the principles and blank development in bent & drawn components 6. understand safety aspects and automation in press working



	MEPBL601	Mini Project - 2B	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/simulations. 5. Analyse the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to life long learning. 9. Demonstrate project management principles during project work.
VII	MEC701	Design of Mechanical System	1. Apply the concept of system design. 2. Select appropriate gears for power transmission on the basis of given load and speed 3. Design material handling systems such as hoisting mechanism of EOT crane, 4. Design belt conveyor systems 5. Design engine components such as cylinder, piston, connecting rod and crankshaft 6. Design pumps for the given applications
	MEC702	Logistics and Supply Chain Management	1. Demonstrate a sound understanding of Logistics and Supply Chain Management concepts and their role in today's business environment. 2. Identify the drivers of supply chain performance and risks in supply chain management. 3. Apply various techniques of inventory management and rank the items using inventory management technique 4. Apply various strategies and techniques to minimize overall logistics cost 5. Understand the role of digitization in supply chain management leading to sustainability 6. Apply various mathematical models/tools to design the supply chain network
	MEDLO7032	Renewable Energy Sources	1. Describe the need for renewable energy and its potential for the development of a sustainable environment. 2. Analyze different solar collectors using geometrical parameters and photovoltaics for generation of solar energy. 3. Identify and analyze various wind turbine energy harnessment techniques. 4. Design biogas plant for harnessing energy from organic waste. 5. Describe significance of hydrogen energy to fulfill present and future energy needs. 6. Describe the operating principle of geothermal energy and ocean energy and their role in sustainable development.
	MEDLO7041	Machinery Diagnostics	1. Relate basic concepts of Machinery Diagnostic. 2. Describe the working of Vibration Measuring Instruments. 3. Apply different Signal Processing Techniques in Vibration Measurement. 4. Identify common faults in Machinery using Vibration Spectrum. 5. Interpret the Vibration Signals for Monitoring and Prognosis.
	ILO7011	Product Lifecycle Management	1. Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation. 2. Illustrate various approaches and techniques for designing and developing products. 3. Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc. 4. Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant
	MEP701	Major Project I	1 Students will be able to develop the understanding of the problem domain through extensive review of literature. 2 Students will be able to identify and analyze the problem in detail to define its scope with problem specific data. 3 Students will be able to identify various techniques to be implemented for the selected problem and related technical skills through feasibility analysis. 4 Students will be able to design solutions for real-time problems that will positively impact society and environment.. 5 Students will be able to develop clarity of presentation based on communication, teamwork and leadership skills. 6 Students will be able to inculcate professional and ethical behavior..
VIII	MEC801	Operations Planning and Control	1. Illustrate operations functions and manage operations in a better way. 2. Apply various strategies to develop aggregate production plan based on the demand forecasting. 3. Apply various algorithms in scheduling and sequencing of manufacturing and service operations 4. Develop Material Requirements Plans (MRP) to estimate the planned order releases. 5. Apply various techniques for facility layout planning and line balancing to optimize the resources
	MEDLO8051	Composite Materials	1. Select the type of material for the fibres and matrix in a composite material for the given application. 2. Relate stresses and strains through the elastic constants for a given lamina. 3. Evaluate elastic properties of a lamina based on the properties of its constituents. 4. Predict failure of a lamina under the given loading condition. 5. Select the number of laminae and their stacking sequence in a composite material for the given loading condition. 6. Identify the type of damage occurring in a composite structure and select an appropriate method to repair it.
	MEDLO8061	Product Design and Development	1. Describe the process of product design & development. 2. Employ engineering, scientific, and mathematical principles to develop and execute a design project from a concept to a finished product. 3. Create 3D solid models of mechanical components using CAD software. 4. Demonstrate individual skills using selected manufacturing techniques such as rapid prototyping. 5. Fabricate an electromechanical assembly of a product from engineering drawings. 6. Work collaboratively in a team to complete a design project. 7. Effectively communicate the results of projects and other assignments both in a written and oral format.
	ILO8029	Environmental Management	1. Understand the concept of environmental management 2. Understand ecosystem and interdependence, food chain etc. 3. Understand and interpret environment related legislations
	MEP801	Project II	1 Students will be able to implement solutions for the selected problem by applying technical and professional skills. 2 Students will be able to analyze impact of solutions in societal and environmental context for sustainable development. 3 Students will be able to collaborate best practices along with effective use of modern tools. 4 Students will be able to develop proficiency in oral and written communication with effective leadership and teamwork. 5 Students will be able to nurture professional and ethical behavior. 6 Students will be able to gain expertise that helps in building lifelong learning experience.



THEEM
Boisar (East), Tal. & Dist. Palghar-401 501

Theem College of Engineering

COURSE OUTCOMES (COs)

Department of Computer Science & Engineering (Artificial Intelligence and Machine Learning)

SEM	Course Code	Course Name	Course Outcomes
III	CSC301	Engineering Mathematics-III	1.Understand the concept of Laplace transform and its application to solve the real integrals in engineering problems. 2.Understand the concept of inverse Laplace transform of various functions and its applications in engineering problems. 3.Expand the periodic function by using the Fourier series for real-life problems and complex engineering problems. 4.Understand complex variable theory, application of harmonic conjugate to get orthogonal trajectories and analytic functions. 5.Apply the concept of Correlation and Regression to the engineering problems in data science, machine learning, and AI. 6.Understand the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
	CSC302	Discrete Structures and Graph Theory	1.Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving. 2.Ability to reason logically. 3.Ability to understand relations, functions, Diagraph and Lattice. 4.Ability to understand and apply concepts of graph theory in solving real world problems. 5.Understand use of groups and codes in Encoding-Decoding 6.Analyze a complex computing problem and apply principles of discrete mathematics to identify solutions
	CSC303	Data Structure	1.Students will be able to implement Linear and Non-Linear data structures. 2.Students will be able to handle various operations like searching, insertion, deletion and traversals on various data structures. 3.Students will be able to explain various data structures, related terminologies and its types. 4.Students will be able to choose appropriate data structure and apply it to solve problems in various domains. 5.Students will be able to analyze and Implement appropriate searching techniques for a given problem. 6.Students will be able to demonstrate the ability to analyze, design, apply and use data structures to solve engineering problems and evaluate their solutions.
	CSC304	Digital Logic & Computer Organization and Architecture	1.To learn different number systems and basic structure of computer system. 2.To demonstrate the arithmetic algorithms. 3.To understand the basic concepts of digital components and processor organization. 4.To understand the generation of control signals of computer. 5.To demonstrate the memory organization. 6.To describe the concepts of parallel processing and different Buses.
	CSC305	Computer Graphics	1.Describe the basic concepts of Computer Graphics. 2.Demonstrate various algorithms for basic graphics primitives. 3.Apply 2-D geometric transformations on graphical objects. 4.Use various Clipping algorithms on graphical objects 5.Explore 3-D geometric transformations, curve representation techniques and projections methods. 6.Explain visible surface detection techniques and Animation.
	CSM301	Mini Project A	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/ simulations. 5. Analyze the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to lifelong learning. 9. Demonstrate project management principles during project work.
IV	CSC401	Engineering Mathematics-IV	1.Apply the concepts of eigenvalues and eigenvectors in engineering problems. 2.Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals. 3.Apply the concept of Z- transformation and inverse in engineering problems. 4.Use the concept of probability distribution and sampling theory to engineering problems. 5.Apply the concept of Linear Programming Problems to optimization.
	CSC402	Analysis of Algorithms	1.Analyze the running time and space complexity of algorithms. 2.Describe, apply and analyze the complexity of divide and conquer strategy. 3.Describe, apply and analyze the complexity of greedy strategy. 4.Describe, apply and analyze the complexity of dynamic programming strategy. 5.Explain and apply backtracking, branch and bound. 6.Explain and apply string matching techniques.
	CSC404	Operating System	1.Understand the objectives, functions and structure of OS 2.Analyze the concept of process management and evaluate performance of processscheduling algorithms. 3.Understand and apply the concepts of synchronization and deadlocks 4.Evaluate performance of Memory allocation and replacement policies 5.Understand the concepts of file management. 6.Apply concepts of I/O management and analyze techniques of disk scheduling.
	CSC405	Microprocessor	1.Describe core concepts of 8086 microprocessor. 2.Interpret the instructions of 8086 and write assembly and Mixed language programs. 3.Identify the specifications of peripheral chip. 4.Design 8086 based system using memory and peripheral chips. 5.Appraise the architecture of advanced processors 6.Understand hyperthreading technology
	CSM401	Mini Project B	1. Identify problems based on societal /research needs. 2. Apply Knowledge and skill to solve societal problems in a group. 3. Develop interpersonal skills to work as member of a group or leader. 4. Draw the proper inferences from available results through theoretical/ experimental/ simulations. 5. Analyze the impact of solutions in societal and environmental context for sustainable development. 6. Use standard norms of engineering practices 7. Excel in written and oral communication. 8. Demonstrate capabilities of self-learning in a group, which leads to lifelong learning. 9. Demonstrate project management principles during project work.

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V	CSC501	Computer Network	1.Demonstrate the concepts of data communication at physical layer and compare ISO - OSI model with TCP/IP model. 2.Explore different design issues at data link layer. 3.Design the network using IP addressing and sub netting / supernetting schemes. 4.Analyze transport layer protocols and congestion control algorithms. 5.Explore protocols at application layer
	CSC502	Web Computing	1 .Select protocols or technologies required for various web applications 2 .Apply JavaScript to add functionality to web pages. . 3 .Design front end application using basic React. . 4 .Construct web based Node.js applications using Express 5 .Design front end applications using functional components of React. 6 .Design back-end applications using Node.js
	CSC503	Artificial Intelligence	1 .Identify the characteristics of the environment and differentiate between various agent architectures. 2 .Apply the most suitable search strategy to design problem solving agents. 3 .Represent a natural language description of statements in logic and apply the inference rules to design Knowledge Based agents. 4 .Apply a probabilistic model for reasoning under uncertainty. 5 .Comprehend various learning techniques. 6 .Describe the various building blocks of an expert system for a given real word problem.
	CSC504	Data Warehousing and Mining	1.Understand data warehouse fundamentals and design data warehouse with dimensional modelling and apply OLAP operations. 2.Understand data mining principles and perform Data preprocessing and Visualization. 3.Identify appropriate data mining algorithms to solve real world problems. 4.Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining 5.Describe complex information and social networks with respect to web mining.
	CSDLO5013	Internet of Things	1.Describe the Characteristics and Conceptual Framework of IoT 2.Differentiate between the levels of the IoT architectures 3.Analyze the IoT access technologies 4.Illustrate various edge to cloud protocol for IoT 5.Apply IoT analytics and data visualization 6.Analyze and evaluate IoT applications
	CSL504	Business Communication & Ethics II	1 .Plan and prepare effective business/ technical documents which will in turn provide solid foundation for their future managerial roles. 2 .Strategize their personal and professional skills to build a professional image and meet the demands of the industry. 3 .Emerge successful in group discussions, meetings and result-oriented agreeable solutions in group communication situations. 4 .Deliver persuasive and professional presentations. 5 .Develop creative thinking and interpersonal skills required for effective professional communication. 6 .Apply codes of ethical conduct, personal integrity and norms of organizational behaviour.
	CSM501	Mini Project 2A	1 .Identify societal/research/innovation/entrepreneurship problems through appropriate literature surveys 2 .dentify Methodology for solving above problem and apply engineering knowledge and skills to solve it 3 .Validate, Verify the results using test cases/benchmark data/theoretical/ inferences/experiments/simulations 4 .Analyze and evaluate the impact of solution/product/research/innovation entrepreneurship towards societal/environmental/sustainable development 5 .Use standard norms of engineering practices and project management principles during project work 6 .Communicate through technical report writing and oral presentation. • The work may result in research/white paper/ article/blog writing and publication • The work may result in business plan for entrepreneurship product created • The work may result in patent filing. 7 .Gain technical competency towards participation in Competitions, Hackathons, etc. 8 .Develop interpersonal skills to work as a member of a group or as leader
VI	CSC601	Data Analytics and Visualization	1.Apply qualitative and quantitative techniques to understand the data 2.Formulate testable hypotheses and evaluate them using common statistical analyses. 3.Perform regression analysis on a given data set for prediction and forecasting. 4.Apply ANOVA method to find the statistical differences between the means in a given data. 5.Fit an ARIMA model for prediction and forecasting of time series data 6.Translate the data into visual context to identify patterns, trends and outliers in large data sets.
	CSC602	Cryptography & System Security	1.Understand system security goals and concepts, classical encryption techniques and acquire fundamental knowledge on the concepts of modular arithmetic and number theory 2.Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication 3.Apply different message digest and digital signature algorithms to verify integrity and achieve authentication and design secure applications
	CSC603	Software Engineering and Project Management	1.Understand and use basic knowledge in software engineering. 2.Identify requirements, analyze and prepare models. 3.Plan, schedule and track the progress of the projects. 4.Design & develop the software solutions for the growth of society 5.Apply testing and assure quality in software solutions 6.Generate project schedule and can construct, design and develop network diagram for different type of Projects. They can also organize different activities of project
	CSC604	Machine Learning	1.Comprehend basics of Machine Learning 2.Build Mathematical foundation for machine learning 3.Understand various Machine learning models 4.Select suitable Machine learning models for a given problem 5.Build Neural Network based models 6.Apply Dimensionality Reduction techniques

	CSM601	Mini Project 2B	1 .Identify societal/research/innovation/entrepreneurship problems through appropriate literature surveys 2 .dentify Methodology for solving above problem and apply engineering knowledge and skills to solve it 3 .Validate, Verify the results using test cases/benchmark data/theoretical/ inferences/experiments/simulations 4 .Analyze and evaluate the impact of solution/product/research/innovation entrepreneurship towards societal/environmental/sustainable development 5 .Use standard norms of engineering practices and project management principles during project work 6 .Communicate through technical report writing and oral presentation. ● The work may result in research/white paper/ article/blog writing and publication ● The work may result in business plan for entrepreneurship product created ● The work may result in patent filing. 7 .Gain technical competency towards participation in Competitions, Hackathons, etc. 8 .Develop interpersonal skills to work as a member of a group or as leader
VII	CSC701	Deep Learning	1 Gain basic knowledge of Neural Networks. 2.Acquire in depth understanding of training Deep Neural Networks. 3.Design appropriate DNN model for supervised, unsupervised and sequence learning applications. 4.Gain familiarity with recent trends and applications of Deep Learning.
	CSC702	Big Data Analytics	1.Understand the key issues in big data management and its associated applications for business decisions and strategy. 2.Develop problem solving and critical thinking skills in fundamental enabling techniques like Hadoop, Map reduce and NoSQL in big data analytics. 3.Collect, manage, store, query and analyze various forms of Big Data. 4.Interpret business models and scientific computing paradigms,and apply software tools for big data analytics. 5.Adapt adequate perspectives of big data analytics in various applications like recommender systems, social media applications
	CSDO7011	Natural Language Processing	1.To have a broad understanding of the field of natural language processing 2.To design language model for word level analysis for text processing 3.To design various POS tagging techniques 4.To design, implement and test algorithms for semantic analysis 5.To develop basic understanding of Pragmatics and to formulate the discourse segmentation and anaphora resolution 6.To apply NLP techniques to design real world NLP applications
	CSDO7022	Blockchain Technologies	1.Describe the basic concept of Blockchain and Distributed Ledger Technology. 2.Interpret the knowledge of the Bitcoin network, nodes, keys, wallets and transactions 3.Implement smart contracts in Ethereum using different development frameworks. 4.Develop applications in permissioned Hyperledger Fabric network. 5.Interpret different Crypto assets and Crypto currencies 6.Analyze the use of Blockchain with AI, IoT and Cyber Security using case studies.
	ILO 7016	Cyber Security and Laws	1.Understand the concept of cybercrime and its effect on outside world 2.Interpret and apply IT law in various legal issues 3.Distinguish different aspects of cyber law 4.Apply Information Security Standards compliance during software design and development
VIII	CSC801	Advanced Artificial Intelligence	1.Acquire basic knowledge of Probabilistic Models. 2.Analyze the working and architecture for Generative Networks. 3.Interpret various components and various types of Autoencoders 4.Understand various aspects of Transfer Learning. 5.Apply ensemble learning techniques to real-world problems and demonstrate improved predictive performance. 6.Relate to the nascent technologies in the field of artificial intelligence
	CSDO8013	Reinforcement Learning	1.Understand different types of robots, specifications of Robots its characteristics and applications. 2.Understanding Direct – Inverse kinematics of robotic manipulator. 3.Identify actuators, sensors, and control of a robot for different applications 4.Developing the differential relationships of motion, velocities and dynamic analysis of force 5.Developing perspectives on AI and Robotics 6.Developing footprints of algorithms, programming associated with Robots and conceptualizing self-configuring Robots and use of Robots in different applications
	CSDO8023	Social Media Analytics	1.Understand the concept of Social media 2.Understand the concept of social media Analytics and its significance. 3.Learners will be able to analyze the effectiveness of social media 4.Learners will be able to use different Social media analytics tools effectively and efficiently. 5.Learners will be able to use different effective Visualization techniques to represent social media analytics. 6.Acquire the fundamental perspectives and hands-on skills needed to work with social media data.
	ILO 8028	Digital Business Management	1.Identify drivers of digital business 2.Illustrate various approaches and techniques for E-business and management 3.Prepare E-business plan

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Boisar (East), Tal. & Dist. Palghar-401 501

H. J. THIM TRUST'S

THEEM COLLEGE OF ENGINEERING

DEPARTMENT OF INFORMATION TECHNOLOGY ENGINEERING

PROGRAMME OUTCOMES (POs)

PO01 : **Engineering knowledge :** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO02 : **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.

PO03 : **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.

PO04 : **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.

PO05 : **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.

PO06 : **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.

PO07 : **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.

PO08 : **Ethics :** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO09 : **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.

CN
COMP

2022-23

H. J. Thim Trust's

THEEM COLLEGE OF ENGINEERING

Village Betegaon, Boisar Chilhar Road, Boisar (E), Tal. & Dist. Palghar - 401 501.

Approved by AICTE (New Delhi), Government of Maharashtra and DTE, Affiliated to University of Mumbai

CURRICULUM IMPLEMENTATION AND ASSESSMENT REPORT (CIAR)

INSTITUTE VISION & MISSION

VISION

To become Centre of Excellence in Technical and Professional education

MISSION

- ★ *To commit for high standards in technical and professional education*
- ★ *To impart quality professional education through ICT initiatives and project based learning*
- ★ *To nurture technocrats and professionals with ethics and human values*

H. J. Thim Trust's

THEEM COLLEGE OF ENGINEERING

Name of Faculty : Nirajsingh Yeotikar
Programme : Computer Engineering
Course Name : Computer Network
Division : A
Year : FE / SE / TE / BE

Course Code : CSC503
Semester : V th

A.Y 2022-23 odd

TIME TABLE

Days	Time	10:15 AM to 11:15 AM	11:15 AM to 12:15 PM	12:15 PM to 01:15 PM	01:15 PM to 02:00 PM	02:00 PM to 03:00 PM	03:00 PM to 04:00 PM	04:00 PM to 05:00 PM	05:00 PM to 06:00 PM	
Monday					L	CN				
Tuesday			CN		U					
Wednesday			← CN Lab	B1 →	N					
Thursday					C		← CN Lab	B2 →		
Friday			← CN Lab	B3 →	H	CN				

Sign. of Teacher

Sign. of HOD

Course Outcomes :

At the end of the course student will be able to:		PO/PSO	Bloom Level
CSC 503.1	Demonstrate the concepts of data communication at physical layer and compare ISO-OSI model with TCP/IP model.	PO1, PO2, PO3, PO12 PO4, PO5, PO3,	Understanding, Apply Analyzing PSO1, PSO2
CSC 503.2	Explore different design issues at data link layer.	PO1, PO2, PO3, PO4 PO4, PO5, PO3, PO12 PSO1, PSO2	Understanding, Apply, Analyzing
CSC 503.3	Design the network using IP addressing and sub-netting / supernetting schemes.	PO1, PO2, PO3, PO4, PO5, PO3, PO12, PSO1, PSO2	Understanding, Apply, create
CSC 503.4	Analyze transport layer protocols and congestion control algorithms.	PO1, PO2, PO3, PO4, PO5, PO3, PO12 PSO1, PSO2	Analyzing, Understanding
CSC 503.5	Explore protocols at application layer.	PO1, PO2, PO3, PO4 PO5, PO3, PO12 PSO1, PSO2	Understanding,
CSL 502.1	Design & setup network environment in Linux/Windows	PO1, PO2, PO3, PO4 PO5, PO3, PO12 PSO1, PSO2	Understanding, Apply, create.
CSL 502.2	Use Network tools and simulators such as NS2, Wireshark, Cisco packet tracer, etc. to explore networking algorithms & protocols.	PO1, PO2, PO3, PO4 PO5, PO3, PO12 PSO1, PSO2	Apply, Analyzing

Mapping of CO with PO : (Target Level)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	Correlation
CSC 503.1	3	3	2	3	3				2			2	2	1		
CSC 503.2	3	3	3	2	2				1			1	2	2		
CSC 503.3	3	3	3	3	3				3			3	3	3		1 : LOW
CSC 503.4	3	3	2	3	2				1			2	2	2		2 : MODERATE
CSC 503.5	3	3	2	3	3				1			2	1	1		3: HIGH
CSL 502.1	3	3	3	2	2				3			3	3	3		
CSL 502.2	3	2	3	2	3				2			3	3	3		
	3	2.85	2.57	2.57	2.57				~~1.85~~ 1.85			2.14	2.28	2.14		

Theem College of Engineering

Department of Computer Science and Engineering

(Artificial Intelligence and Machine Learning)

Success... through quality education !

Lab Manual

Microprocessor (CSC405)

S.E. SEM-IV

PROGRAMME OUTCOMES (POs):

PO1 - Engineering knowledge

PO2 - Problem analysis

PO3 - Design/development of solutions

PO4 - Conduct investigations of complex problems

PO5 - Modern tool usage

PO6 - The engineer and society

PO7 - Environment and sustainability

PO8 – Ethics

PO9 - Individual and team work

PO10 – Communication

PO11 - Project management and finance

PO12 - Life-long learning

COURSE OUTCOMES (COs): **On successful completion of course, learner will be able to:**

1. Describe core concepts of 8086 microprocessor
2. Interpret the instructions of 8086 and write assembly and Mixed language programs.
3. Identify the specifications of peripheral chip.
4. Design 8086 based system using memory and peripheral chips.
5. Appraise the architecture of advanced processors
6. Understand hyperthreading technology

LAB OUTCOMES: **At the end of the course, the students will be able to:**

1. Use appropriate instructions to program microprocessor to perform various task
2. Develop the program in assembly/ mixed language for Intel 8086 processor
3. Demonstrate the execution and debugging of assembly/ mixed language program

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Course Code:	Course Title	Credit
CSC503	Computer Network	3

Prerequisite: None	
Course Objectives:	
1	To introduce concepts and fundamentals of data communication and computer networks.
2	To explore the inter-working of various layers of OSI.
3	To explore the issues and challenges of protocols design while delving into TCP/IP protocol suite.
4	To assess the strengths and weaknesses of various routing algorithms.
5	To understand various transport layer and application layer protocols.
Course Outcomes: On successful completion of course, learner will be able to	
1	Demonstrate the concepts of data communication at physical layer and compare ISO - OSI model with TCP/IP model.
2	Explore different design issues at data link layer.
3	Design the network using IP addressing and sub netting / supernetting schemes.
4	Analyze transport layer protocols and congestion control algorithms.
5	Explore protocols at application layer

Module		Content	Hrs
1		**Introduction to Networking**	4
	1.1	Introduction to computer network, network application, network software and hardware components (Interconnection networking devices), Network topology, protocol hierarchies, design issues for the layers, connection oriented and connectionless services	
	1.2	Reference models: Layer details of OSI, TCP/IP models. Communication between layers.	
2		**Physical Layer**	3
	2.1	Introduction to Communication Electromagnetic Spectrum	
	2.2	Guided Transmission Media: Twisted pair, Coaxial, Fiber optics.	
3		**Data Link Layer**	8
	3.1	DLL Design Issues (Services, Framing, Error Control, Flow Control), Error Detection and Correction(Hamming Code, CRC, Checksum) , Elementary Data Link protocols , Stop and Wait, Sliding Window(Go Back N, Selective Repeat)	
	3.2	**Medium Access Control sublayer** Channel Allocation problem, Multiple access Protocol(Aloha, Carrier Sense Multiple Access (CSMA/CD)	
4		**Network layer**	12
	4.1	Network Layer design issues, Communication Primitives: Unicast, Multicast, Broadcast. IPv4 Addressing (classfull and classless), Subnetting, Supernetting design problems ,IPv4 Protocol, Network Address Translation (NAT), IPv6	
	4.2	**Routing algorithms :** Shortest Path (Dijkastra's), Link state routing, Distance Vector Routing	
	4.3	**Protocols** - ARP,RARP, ICMP, IGMP	

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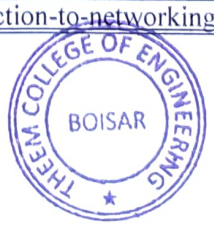
	4.4	**Congestion control algorithms:** Open loop congestion control, Closed loop congestion control, QoS parameters, Token & Leaky bucket algorithms	
5		**Transport Layer**	**6**
	5.1	**The Transport Service**: Transport service primitives, Berkeley Sockets, Connection management (Handshake), UDP, TCP, TCP state transition, TCP timers	
	5.2	TCP Flow control (sliding Window), TCP Congestion Control: Slow Start	
6		**Application Layer**	**6**
	6.1	DNS: Name Space, Resource Record and Types of Name Server. HTTP, SMTP, Telnet, FTP, DHCP	

Textbooks:	
1	A.S. Tanenbaum, **Computer Networks**,4th edition Pearson Education
2	B.A. Forouzan, **Data Communications and Networking**, 5th edition, TMH
3	James F. Kurose, Keith W. Ross, **Computer Networking, A Top-Down Approach Featuring the Internet**,6th edition, Addison Wesley
References:	
1	S.Keshav,**An Engineering Approach To Computer Networking**, Pearson
2	Natalia Olifer & Victor Olifer,**Computer Networks: Principles, Technologies & Protocols for Network Design**, Wiley India, 2011.
3	Larry L.Peterson, Bruce S.Davie, **Computer Networks: A Systems Approach**, Second Edition ,The Morgan Kaufmann Series in Networking

Assessment:	
Internal Assessment:	
Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 40% syllabus is completed. Duration of each test shall be one hour.	
End Semester Theory Examination:	
1	Question paper will comprise of total six questions.
2	All question carries equal marks
3	Questions will be mixed in nature (for example supposed Q.2 has part (a) from module 3 then part (b) will be from any module other than module 3)
4	Only Four question need to be solved.
5	In question paper weightage of each module will be proportional to number of respective lecture hours as mention in the syllabus.

Useful Links	
1	https://www.netacad.com/courses/networking/networking-essentials
2	https://www.coursera.org/learn/computer-networking
3	https://nptel.ac.in/courses/106/105/106105081
4	https://www.edx.org/course/introduction-to-networking

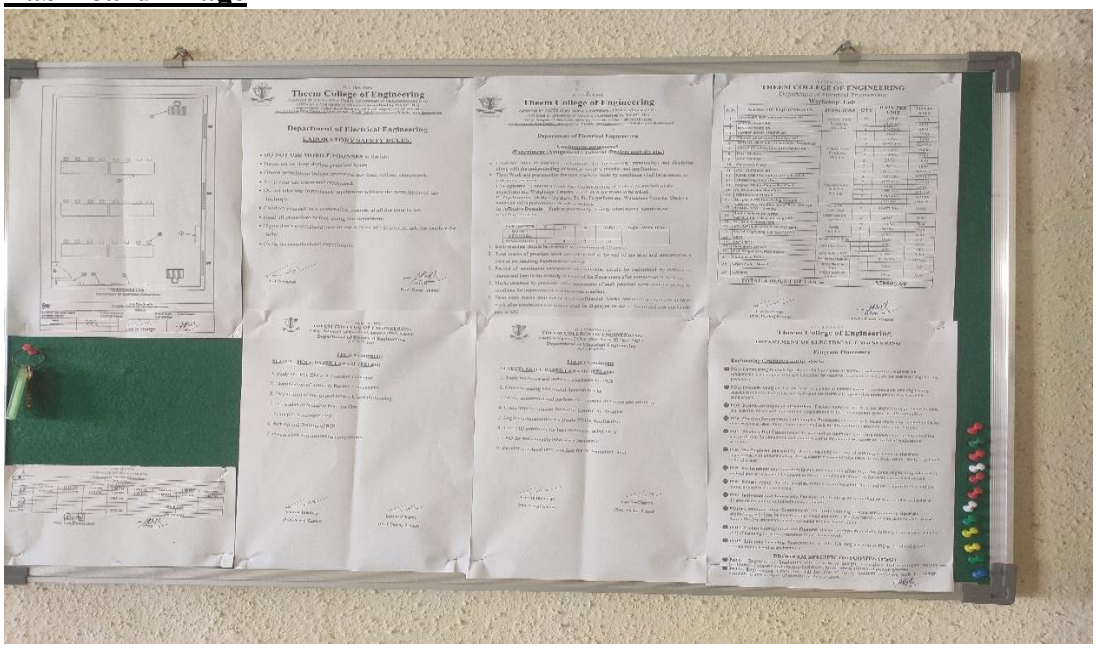


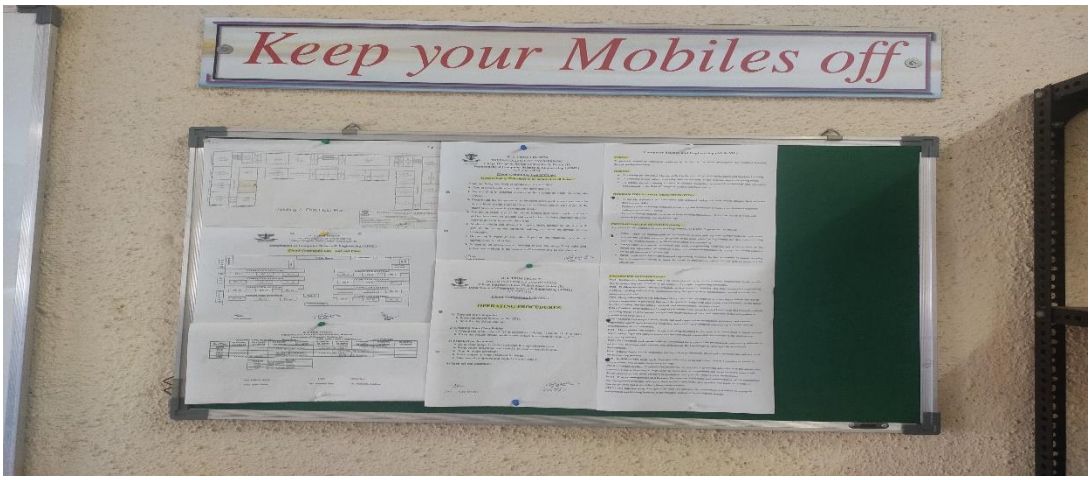
- **Outcome Based Education (OBE) Workshop**

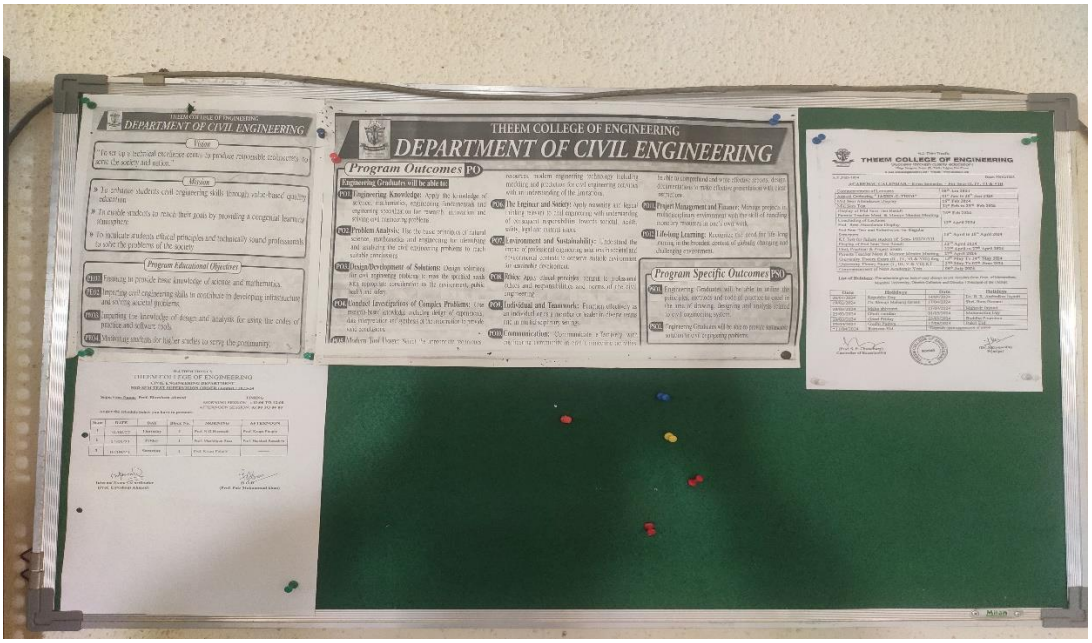
- **Weblink**

Name of Department	Weblink
Applied Science and Humanities	https://theemcoe.org/course-degree.php?dept=fe
Automobile Engineering	https://theemcoe.org/course-degree.php?dept=auto
Civil Engineering	https://theemcoe.org/course-degree.php?dept=civil
Computer Engineering	https://theemcoe.org/course-degree.php?dept=comp
Computer Science and Engineering (AIML)	https://theemcoe.org/course-degree.php?dept=cseaiml
Electrical Engineering	https://theemcoe.org/course-degree.php?dept=elec
Information Technology	https://theemcoe.org/course-degree.php?dept=it
Mechanical Engineering	https://theemcoe.org/course-degree.php?dept=mech

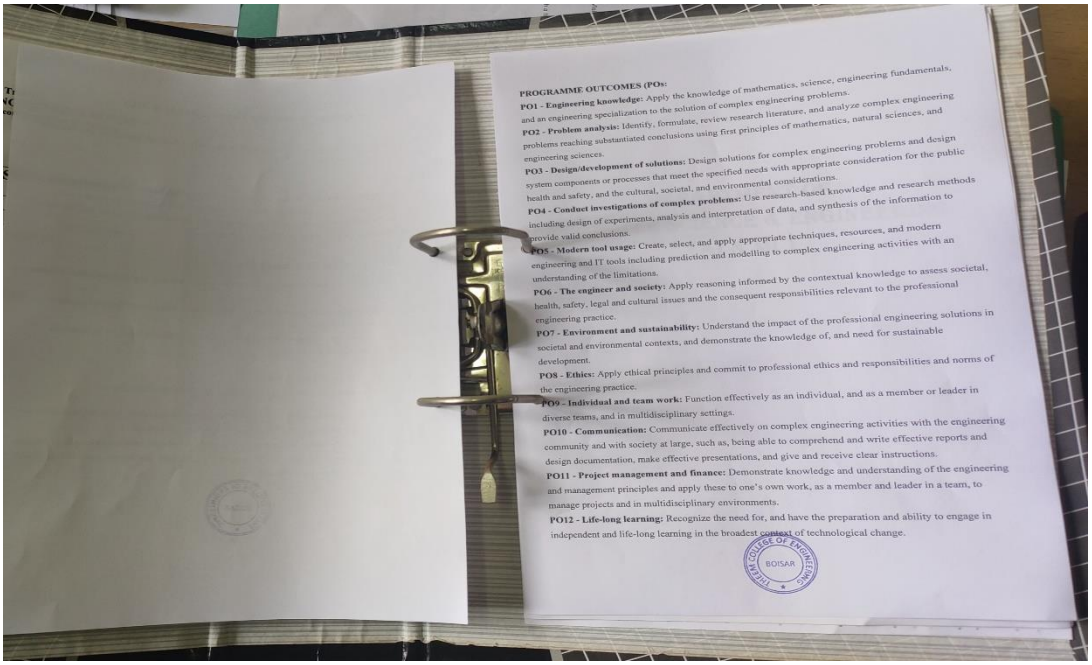
- **Lab Board Image**







- **Department File**



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