



## Department of Civil Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** Use academic and professional experience to practice in the streams of Civil Engineering.

**PEO2:** Plan, design and execute Civil Engineering Projects.

**PEO3:** Engage in successful careers and eminent positions in industry, academics, government and research.

**PEO4:** Continue lifelong learning to remain effective professionals in their work places.

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

**PSO1:** Plan, analyze, design, estimate and execute projects in the field of structural, concrete, and geotechnical engineering.

**PSO2:** Apply, modern techniques of construction, management tools and equipment to execute cost effective projects in stipulated time.

  
HOD  
**Head Of Department**  
Civil Engineering  
Pravara Rural Engineering College  
Loni, Tal. Rahata

  
Principal  
Pravara Rural Engineering  
College, Loni



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## Department of Civil Engineering

### Course Outcomes (2019 Course)

#### S.E Civil Engineering

<b>Course Name:-Building Technology and Architectural Planning (201001)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- III</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 4 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C201.1	Identify types of building and basic requirements of building components.	L1	Identify
C201.2	Apply Architectural Principles and Building byelaws for building construction.	L2	Understand
C201.3	Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code	L5	Plan
C201.4	Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code	L5	Plan
C201.5	Apply Principles of Planning in Town Planning, Different Villages and Safety aspects.	L3	Apply
C201.6	Understand different services and safety aspects of buildings	L2	Understand



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<b>Course Name:-Mechanics of Structure (201002)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- III</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 4 hrs./week</b>	<b>02</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C202.1	Determine stresses, strains and elongations in axially loaded bar structures; and members subjected to thermal loads.	L3	<b>Apply</b>
C202.2	Analyze and draw shear force and bending moment diagrams for simply supported and cantilever beams of uniform cross-section.	L4	<b>Analyze</b>
C202.3	Determine bending stresses, shear stresses and moment resisting capacity of prismatic beams using Euler-Bernoulli beam theory.	L3	<b>Apply</b>
C202.4	Solve problems relating to torsional deformation of bars using torsion theory and Determine concept of Principal stresses and, normal and tangential stresses acting on a structural member.	L3	<b>Apply</b>
C202.5	Determine critical buckling load of axially and eccentrically loaded columns using Euler's and Rankine's formulae.	L3	<b>Apply</b>
C202.6	Determine slope and deflection of determinate beams by Macaulay's method and Strain energy method, Castigliano's first theorem	L3	<b>Apply</b>

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<b>Course Name:-Fluid Mechanics (201003)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- III</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C203.1	Summarize basic properties of fluid, concept of fluid static, buoyancy & floatation and its application for solving practical problems.	L2	<b>Understand</b>
C203.2	Illustrate fluid kinematics and fluid dynamic problems with reference to continuity equation and Bernoulli's equation.	L1	<b>Knowledge</b>
C203.3	Interpret dimensional analysis using Buckingham's pi theorem, similarity & model laws and boundary layer theory.	L2	<b>Understand</b>
C203.4	Acquire knowledge of laminar & turbulent flow, flow through pipes and its application to determine major and minor losses to analyse pipe network using Hardy cross method.	L3	<b>Apply</b>
C203.5	Design most economical open channel sections.	L6	<b>Create</b>
C203.6	Acquire knowledge of gradually varied flow in open channel and summarize drag and lift force on fully submerged body	L3	<b>Apply</b>

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<b>Course Name:-Engineering Geology (207003)</b>		
<b>Class:SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- III</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>Insem exam: 50 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 50 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C207003.1	Acquire basic knowledge of different types of rocks and minerals occurring at construction sites and foundation	L2	Acquire
C207003.2	Identify structural features occurring in the rocks and determine their suitability at the foundation of civil engineering structures	L3	Determine
C207003.3	Interpret nature of landforms created by natural processes and their importance in civil engineering activities	L2	Interpret
C207003.4	Determine importance of geological investigation and remote sensing in selection of proper sites for major civil engineering structures	L3	Determine
C207003.5	Acquire knowledge of site selection for construction of dams and excavation of tunnels	L2	Acquire
C207003.6	Determine effects of natural hazards on civil engineering structures and can suggest remedial measures	L3	Determine

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<b>Course Name:-Engineering Mathematics III (207004)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2023-24</b>	<b>Semester- I</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Tutorial: 1 hr./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C207004.1	Solve higher order linear differential equations and its applications to engineering problems.	L3	<b>Solve</b>
C207004.2	Understand and apply various numerical techniques to solve problems in engineering.	L2	<b>Understand</b>
C207004.3	Understand and apply the different types of statistical methods and probability distribution in engineering problems.	L2	<b>Understand</b>
C207004.4	Understand the fundamental concept of vector differentiation and directional derivative.	L2	<b>Understand</b>
C207004.5	Solve Problems on vector integral calculus and its application in Engineering, fluid mechanics problems.	L3	<b>Solve</b>
C207004.6	Study of various partial differential equations such as wave equation, one and two-dimensional heat flow equations.	L3	<b>Apply</b>

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<b>Course Name:- Geotechnical Engineering (201008)</b>		
<b>Class:SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-2023</b>	<b>Semester- IV</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>
		<b>Oral: 50 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C208.1	Identify and determine index properties of soil by ARE and Unified classification system.	L1	<b>Knowledge</b>
C208.2	Determine the soil properties in laboratory and develop a proficiency in handling experimental data	L1	<b>Knowledge</b>
C208.3	Understand the concept of effective stress and its influence on soil behaviour.	L2	<b>Understand</b>
C208.4	Develop and understand the influence of water flow on the engineering behaviour of soils.	L6	<b>Create</b>
C208.5	Compute the lateral thrust on the retaining walls, Identify the modes of failure of soil slopes and acquire the knowledge of Geoenvironmental Engineering	L3	<b>Apply</b>

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<b>Course Name:-Surveying (201009)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2020-21</b>	<b>Semester- IV</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 4 hrs./week</b>	<b>02</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C209.1	Define and explain the basics of plane surveying and differentiate the instruments used for it.	L1	<b>Knowledge</b>
C209.2	Express proficiency in handling surveying equipment and analyzing the surveying data from this equipment.	L2	<b>Understand</b>
C209.3	Describe different methods of surveying and find relative positions of points on the surface of the earth.	L2	<b>Understand</b>
C209.4	Execute curve setting for civil engineering projects such as roads, railways, etc.	L3	<b>Apply</b>
C209.5	Establish advancements in surveying such as space-based positioning systems.	L3	<b>Apply</b>
C209.6	Differentiate map and aerial photographs, and also interpret aerial photographs.	L4	<b>Analyze</b>

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<b>Course Name:-Concrete Technology (201010)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- IV</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>
		<b>Term Work: 25 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C210.1	Understand chemistry of cement and properties of other ingredients of concrete as per there IS specifications.	L2	<b>Understand</b>
C210.2	Prepare and test the properties of fresh concrete as per exposure conditions.	L3	<b>Apply</b>
C210.3	Investigate hardened concrete with destructive and non-destructive testing instruments using IS code procedures.	L4	<b>Analyze</b>
C210.4	Design concrete mix for desired material properties and strength by using IS code/DOE method	L6	<b>Create</b>
C210.5	Get acquainted to concreting equipments, techniques and different types special concrete types as per specifications	L2	<b>Understand</b>
C210.6	Predict deteriorations in concrete and get acquainted to various repairing methods and techniques as per exposure condition and type of damage	L5	<b>Evaluate</b>

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<b>Course Name:-Structural Analysis (201011)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- IV</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In-semester Evaluation: 30 Marks</b>
<b>Tutorial: 1hr / week</b>		<b>End semester Evaluation:70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C211.1	Illustrate the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.	L4	<b>Analyze</b>
C211.2	Analyse redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.	L4	<b>Analyze</b>
C211.3	Implement application of the slope deflection method to beams and portal frames.	L3	<b>Apply</b>
C211.4	Analyse beams and portal frames using moment distribution method.	L4	<b>Analyze</b>
C211.5	Determine response of beams and portal frames using structure approach of stiffness matrix method.	L3	<b>Apply</b>
C211.6	Apply the concepts of plastic analysis in the analysis of steel structures.	L3	<b>Apply</b>

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<b>Course Name:-Project Management(201012)</b>		
<b>Class: SE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- IV</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: -----</b>	<b>----</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C212.1	Describe project life cycle and the domains of Project Management.	L2	Understand
C212.2	Explain networking methods and their applications in planning and management.	L2	Understand
C212.3	Categorize the materials as per their annual usage and also Calculate production rate of construction equipment.	L4	Analysis
C212.4	Demonstrates resource allocation techniques and apply it for manpower planning.	L3	Application
C212.5	Summarize economical terms and different laws associated with project management.	L2	Understand
C212.6	Apply the methods of project selection and recommend the best economical project.	L3	Application

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Course Outcomes (2019 Course)

T.E Civil Engineering

Hydrology and Water Resources Engineering (301001)		
Class: TE Civil (2019 Pattern)	A.Y. 2021-22	Semester- V
Teaching Scheme	Credit	Examination Scheme
Lectures: 3 hrs./week	03	In Semester exam: 30 Marks
Practical: 2 hrs./week	02	End Semester exam: 70 Marks

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C301.1	Recognise the components of hydrological cycle for computing precipitation	L1	Knowledge
C301.2	Describe the basic requirements of irrigation, various irrigation techniques for determining water requirements of the crops	L1	Knowledge
C301.3	Discuss the key components of a functioning groundwater for determining the main aquifer properties – permeability, transmissivity and storage. Also Compute the discharge of well	L2	Understand
C301.4	Compute unit hydrograph, flood hydrograph, synthetic unit hydrograph for Perform flood frequency analysis	L3	Apply
C301.5	Apply of mass curve and demand curves for Fixation of reservoir capacity from annual inflow and outflow	L3	Apply
C301.6	Apply science and engineering fundamentals to solve current problems and to anticipate, mitigate and prevent future problems in the area of water resources management	L3	Apply



<b>Course Name:- Water Supply Engineering (301002)</b>		
<b>Class:TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- V</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C302.1	Identify and describe reliability of water sources, estimate water requirement for various sectors(Domestic and Public Sector)	L2	<b>Knowledge</b>
C302.2	Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics	L2	<b>Understand</b>
C302.3	Design various treatment units of water treatment plant.	L6	<b>Create</b>
C302.4	Comprehend and compare contemporary issues and advanced treatment operations and process available in the market.	L2	<b>Understand</b>
C302.5	Comprehend the knowledge of water distribution system for water supply, use of GIS and drone technology in water management. And design elevated service reservoir capacity and rainwater harvesting system.	L6	<b>Create</b>
C302.6	Interpret the requirement of water treatment plant for infrastructure and Government scheme.	L2	<b>Understand</b>

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<b>Course Name:-Design of steel structure(301003)</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- V</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 4 hrs./week</b>	<b>02</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C303.1	Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.	L3	<b>Demonstrate</b>
C303.2	Design of axially loaded rolled and built-up compression member along with lacing and battening as per Limit state method.	L6	<b>Create</b>
C303.3	Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending as per Limit state method.	L6	<b>Create</b>
C303.4	Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section as per Limit state method	L6	<b>Create</b>
C303.5	Analyze and design the industrial truss for dead, live and wind load and design of gantry girder for moving load as per Limit state Method.	L4 & L6	<b>Create</b>
C303.6	Design cross section for welded plate girder including stiffeners and its connections as per Limit state design.	L6	<b>Create</b>

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<b>Course Name:-Engineering Economics &amp;Financial management(301004 )</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2023-24</b>	<b>Semester- V</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: -----</b>	<b>----</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C304.1	Describe basics of construction economics.	L2	<b>Understand</b>
C304.2	Illustrate financial management in civil engineering projects.	L2	<b>Understand</b>
C304.3	Prepare and analyze the contract account.	L4	<b>Analysis</b>
C304.4	Decide on right source of fund for construction projects.	L4	<b>Analysis</b>
C304.5	Summarize working capital and its estimation for civil engineering projects..	L2	<b>Understand</b>
C304.6	Illustrate the importance of tax planning &summarize role of financial regulatory bodies in India.	L3	<b>Application</b>

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<b>Course Name:-Research Methodology and IPR (Elective I) (301005b)</b>		
<b>Class:TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-2022</b>	<b>Semester- V</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>
		<b>Term Work : 25 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C305b.1	Determine the research problems for civil engineering domain.	L3	<b>Apply</b>
C305b.2	Analyze the available literature for given research problem and illustrate different techniques of literature survey thereby gap identification.	L4	<b>Analyze</b>
C305b.3	Recognize the importance of data collection and investigate the statistical and reliability methods of preliminary data analysis.	L4	<b>Analyze</b>
C305b.4	Explain the important concept of interpretation and develop technical writing and presentation skills	L1	<b>Knowledge</b>
C305b.5	Comprehend the various forms of the intellectual property, its relevance and business impact in the changing global business environment.	L2	<b>Understand</b>
C305b.6	Realize the importance of patents, trademark and copyright and follow research ethics.	L5	<b>Evaluate</b>

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<b>Course Name:-Advanced Concrete Technology (301005d)</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- V</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>
		<b>Term Work: 25 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C305d.1	Understand the chemistry of cement and its effect on properties of concrete.	L2	<b>Understand</b>
C305d.2	Apply the knowledge of supplementary cementations materials to produce sustainable concretes	L3	<b>Apply</b>
C305d.3	Illustrate the Mechanism of working of admixtures and their effects on properties of concrete	L3	<b>Apply</b>
C305d.4	Discuss the characteristic properties of fiber reinforced concrete	L2	<b>Understand</b>
C305d.5	Evaluate the durability properties of concrete	L5	<b>Evaluate</b>
C305d.6	Interpret the properties of concrete through advance testing methods	L5	<b>Evaluate</b>

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<b>Course Name:-Seminar (301006)</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- V</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Tutorial</b>	<b>01</b>	<b>TW: 50 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C306.1	Appraise the current civil engineering research / techniques / developments / Interdisciplinary areas.	L5	<b>Evaluate</b>
C306.2	Review and organize literature survey utilizing technical resources, journals etc.	L2	<b>Understand</b>
C306.3	Evaluate and draw conclusions related to technical content studied.	L5	<b>Evaluate</b>
C306.4	Demonstrate the ability to perform critical writing by preparing a technical report.	L6	<b>Create</b>
C306.5	Develop technical writing and presentation skills.	L6	<b>Create</b>

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<b>Course Name:-Waste Water Engineering (301012)</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- VI</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C312.1</b>	Identify and understand sanitation infrastructure, quantification and characterization of wastewater and effluent discharge standards as per CPCB norm	L2	<b>Understand</b>
<b>C312.2</b>	Design preliminary and primary unit operations in waste water treatment plant.	L6	<b>Create</b>
<b>C312.3</b>	Apply the theory and mechanism of aerobic biological treatment system to design activated sludge process	L3	<b>Apply</b>
<b>C312.4</b>	Design suspended growth and attached growth wastewater design system.	L6	<b>Create</b>
<b>C312.5</b>	Apply and understand concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems	L3	<b>Apply</b>
<b>C312.6</b>	Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment	L2	<b>Understand</b>

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<b>Course Name:-Advanced Engineering Geology with Rock Mechanics (301015 a)</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2021-22</b>	<b>Semester- VI</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C315a.1	Identify various Seismic zones and Physiographic divisions of India	L1	Identify
C315a.2	Demonstrate relationship of effects of soil erosion on Engineering projects	L3	Demonstrate
C315a.3	Demonstrate role of Engineering Geology for resource planning and sustainable development of the region	L3	Demonstrate
C315a.4	Interpret field data with reference to core recovery,RQD,RMR,RSR	L2	Interpret
C315a.5	Recognize Tail channel erosion and suggest appropriate remedial measures	L5	Recognize suggest
C315a.6	Apply Rock Mechanics systems for evaluating Tunnels, Bridges and Dams	L5	Evaluate Apply

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<b>Course Name:-Elective II: Architecture and Town Planning (301015 e)</b>		
<b>Class: TE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- VI</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>--</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C315e.1	Apply the principles of architectural planning and landscaping for improving quality of life	L3	Apply
C315e.2	Understand the confronting issues of the area and apply the acts.	L2	Understand
C315e.3	Evaluate and defend the proposals.	L5	Evaluate
C315e.4	Appraise the existing condition and to develop the area for betterment	L6	Create

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Course Outcomes (2019 Course)

B.E Civil Engineering

Course Name:-Foundation Engineering (401001)		
Class: BE Civil (2019 Pattern)	A.Y. 2022-23	Semester- VII
Teaching Scheme	Credit	Examination Scheme
Lectures: 3 hrs./week	03	In-semester Evaluation: 30 Marks
		End semester Evaluation:70 Marks

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C401.1	Perform subsurface investigations for foundations using different methods.	L3	Apply
C401.2	Estimate the bearing capacity of shallow foundations.	L3	Apply
C401.3	Calculate immediate and primary consolidation settlement of shallow foundations.	L3	Apply
C401.4	Decide the capacity of a pile and pile group.	L5	Evaluate
C401.5	Understand the steps in geotechnical design of shallow foundations and well foundations.	L2	Understand
C401.6	Analyze problems related to expansive soil and overcome them using design principles, construction techniques in black cotton soil.	L4	Analyze

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<b>Course Name:-Transportation Engineering (401002)</b>		
<b>Class: BE Civil (2019 Pattern)</b>	<b>A.Y. 2022-2023</b>	<b>Semester- VII</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practicals:2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C402.1	Interpret highway development & planning.	L2	<b>Understand</b>
C402.2	Analyze geometric design of highways.	L4	<b>Analyze</b>
C402.3	Apply knowledge in traffic engineering & control.	L3	<b>Apply</b>
C402.4	Computation of design traffic, pavement materials, testing procedure, construction & maintenance.	L3	<b>Apply</b>

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<b>Course Name:-Advanced Design of Concrete Structures (401003b)</b>		
<b>Class: BE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- 7<sup>th</sup></b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>02</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C403b.1	Design and detailing of Flat slab by direct design method.	L6	<b>Design</b>
C403b.2	Analyze and design of rectangular, triangular and circular slabs having different edge conditions using yield line theory.	L4 &L6	<b>Analyze</b>
C403b.3	Analyze and design of retaining walls with various backfill conditions.	L4 &L6	<b>Analyze</b>
C403b.4	Analyze and design of liquid retaining structures by approximate method and I.S. code method.	L4 &L6	<b>Analyze</b>
C403b.5	Analyze and design of Shear wall and ductile detailing wall	L4 &L6	<b>Analyze</b>
C403b.6	Analyze and design of RC frames by Seismic coefficient method	L4 &L6	<b>Analyze</b>

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<b>Dams and Hydraulic Structures (401011)</b>		
<b>Class:BE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- VIII</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>02</b>	<b>End Semester exam: 70 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C411.1	Recognise various types of dams and instrumentation in dam safety monitoring.	L1	<b>Knowledge</b>
C411.2	Interpret the design loading and stresses upon gravity dam towards stability Conditions	L2	<b>Understand</b>
C411.3	Design the profile of spillway and energy dissipater to safeguard dam site	L6	<b>Create</b>
C411.4	Analyze case studies for zoned earthen dam and diversion head works to effectively channelize the water	L4	<b>Analyze</b>
C411.5	Design of canal and its components to develop irrigation systems	L6	<b>Create</b>
C411.6	Develop cross drainage works and river training structures towards Civil Engineering applications	L6	<b>Create</b>

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<b>Course Name:-Quantity Surveying, Contracts and Tenders (401012)</b>		
<b>Class: BE Civil (2019 Pattern)</b>	<b>A.Y. 2022-23</b>	<b>Semester- VIII</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C412.1	Interpret estimates and related terms for the civil engineering projects.	L2	<b>Understand</b>
C412.2	Compare various methods of inviting tenders in construction practices	L4	<b>Analyze</b>
C412.3	Categorized various types of contract in construction practices	L4	<b>Analyze</b>
C412.4	Estimate civil engineering projects by taking out quantities and summarize bar bending schedule.	L5	<b>Evaluate</b>
C412.5	Prepare rate analysis for the various items of work with detailed specification.	L3	<b>Apply</b>
C412.6	Prepare valuation of building. by using various methods of valuation of building	L3	<b>Apply</b>

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<b>Course Name:-Structural Audit and Retrofitting of structure (Elective V) (401013f)</b>		
<b>Class: BE Civil (2019 Pattern)</b>	<b>A.Y. 2022-2023</b>	<b>Semester- VIII</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: 2 hrs./week</b>	<b>01</b>	<b>End Semester exam: 70 Marks</b>
		<b>Term Work : 50 Marks</b>

<b>Course Outcome Code</b>	<b>Course Outcomes(COs):</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C413f.1</b>	Identify causes of deterioration in RC and steel structures.	L2	Understand
<b>C413f.2</b>	Explore entire process of structural audit.	L3	Apply
<b>C413f.3</b>	Determine the necessity and methods of structural health monitoring.	L3	Apply
<b>C413f.4</b>	Explain method of retrofitting for RC, steel and historical structures	L2	Understand
<b>C413f.5</b>	Design retrofitting using FRP for RC column and RC beams	L4	Design

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<b>Course Name:-TQM &amp; MIS in Civil Engineering (Elective-VI)(401014a)</b>		
<b>Class: BE Civil (2019 Pattern)</b>	<b>A.Y. 2023-24</b>	<b>Semester- VIII</b>
<b>Teaching Scheme</b>	<b>Credit</b>	<b>Examination Scheme</b>
<b>Lectures: 3 hrs./week</b>	<b>03</b>	<b>In Semester exam: 30 Marks</b>
<b>Practical: -----</b>	<b>----</b>	<b>End Semester exam: 70 Marks</b>

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C414a.1	Summarise quality and contribution of quality gurus for evaluation of best practices.	L2	Understand
C414a.2	Relate the functioning and application of TQM & Six Sigma in the domain of construction sector	L4	Analysis
C414a.3	Refer ISO 9001 principles in preparation of quality manual to construction field.	L5	Synthesis
C414a.4	Apply management control & certification systems for construction industry.	L3	Apply
C414a.5	Select TQM process implementation and various quality awards for construction sector.	L4	Analysis
C414a.6	Refer MIS for allied fields in construction sector.	L5	Synthesis

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Project (401015)		
Class: BE Civil (2019 Pattern)	A.Y. 2022-23	Semester- VIII
Teaching Scheme	Credit	Examination Scheme
Lectures:	0	TW: 100 Marks
Practical: 2 hrs./week	02	OR: 50 Marks

Course Outcome Code	Course Outcomes(COs):	Bloom's Taxonomy	
		Level	Descriptor
C415.1	Identify the problem that deals with society, industry or research needs based on investigated literature survey to explore recent technical trends.	L1	Knowledge
C415.2	Analyze identified problem based on parameters essential.	L2	Understand
C415.3	Design appropriate solution for prototype system to ensure performance, safety and the quality.	L6	Create
C415.4	Execute the methodology with modern tools and provide a sustainable solution with effective utilization of the resources available and compare results with existing systems.	L3	Apply
C415.5	Involve in work as an individual and contribute as a team member with effective management skills to achieve a desired objective.	L2	Understand
C415.6	Develop the Project Report in written and also present orally with ethical values	L6	Create

  
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Civil Engineering  
Pravara Rural Engineering College  
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Principal  
Pravara Rural Engineering  
College, Loni



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## Department of Chemical Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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

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

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** To impart strong knowledge of fundamentals to the students so that they can be good practicing engineers in Chemical Engineering.

**PEO2:** To teach basic concepts, knowledge through experimentation, scientific literature & prediction of system behavior by models & simulations.

**PEO3:** To develop overall personality, inculcate team spirit & capability of shouldering responsibility of nation building.

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

**PSO1:** Apply the knowledge of basic science and basic courses of the Chemical Engineering in industry.

**PSO2:** Acquire the skills of design and analysis of the Chemical process or system to meet the desired needs within the practical limits.

**PSO3:** Ability to use the innovative techniques, skills and modern engineering tools necessary to industry and society.

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Principal  
Pravara Rural Engineering  
College, Loni



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## Department of Chemical Engineering

### Course Outcomes (2019 Course) S.E. Chemical Engineering

<b>Course:</b>	<b>Engineering Mathematics-III</b>	<b>Course Code:207004</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical/Tutorial Teaching Scheme: 1Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C204.1	Solve higher order linear differential equations and its applications to engineering problems.	3	Solve
C204.2	Apply Integral transform techniques such as Laplace transform to solve differential equations and their applications.	3	Apply
C204.3	Apply Integral transform techniques such as Fourier transform to solve differential equations and their applications.	3	Apply
C204.4	Apply Statistical methods like correlation & regression and probability theory as applicable to analyzing and interpreting experimental data in testing and quality control.	3	Apply
C204.5	Perform vector differentiation & integration, analyze the Vector fields and apply to fluid flow problems.	4	Perform
C204.6	Solve Partial differential equations such as wave equation, One and two dimensional heat flow equations.	3	Solve



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<b>Course:</b>	<b>Industrial Chemistry-I</b>	<b>Course Code:209341</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 4Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C241.1	Analyse the type of forces and understand the materials based on their properties	2	Analyse
C241.2	Estimate the kinetics of reaction and analyse the factors controlling the rate of reactions.	3	Estimate
C241.3	Analyse the given chemical substance by different techniques like qualitative analysis, spectrophotometer.	2	Analyse
C241.4	Estimate the quantity of solute and understand colligative properties of solution.	3	Estimate
C241.5	Evaluate the mechanism of reactions and apply proper factor for increasing the yield of the desired product.	3	Evaluate
C241.6	Apply the basic concepts of dyes and understand industrially important dyes.	3	Apply

<b>Course:</b>	<b>Fluid Mechanics</b>	<b>Course Code:209342</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 2Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C242.1	Determine fluid properties and rheological behaviour of fluids	2	Determine
C242.2	Apply the equation of fluid statics and select manometers for the pressure measurement	4	Apply
C242.3	Analyze basic equations of fluid flow and their applications to determine fluid flow rate by different devices.	3	Analyze
C242.4	Develop mathematical equations for flow of fluid through Different systems and determine different losses occurring in pipelines.	1	Develop



<b>C242.5</b>	Formulate correlations amongst the system variables using dimensional analysis and to study concept of boundary layer theory.	1	Formulate
<b>C242.6</b>	Select valves and pumps for transportation of fluid through pipelines and concept of fluidization.	5	Select

<b>Course:</b>	<b>Engineering Material</b>	<b>Course Code:209343</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 2Hrs/Week</b>	

<b>Course Outcomes</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C243.1</b>	Describe scope of Engineering materials, properties of materials and Selection of materials	1	Remembering
<b>C243.2</b>	Test different engineering materials. Materials and describe Organic materials.	2	Understand
<b>C243.3</b>	Understand different metals and organic materials.	3	Applying
<b>C243.4</b>	Define corrosion, describe it's types, Control and prevent Corrosion.	3	Applying
<b>C243.5</b>	Understand the knowledge of Non material's and its Synthesis.	6	Understand
<b>C243.6</b>	Apply the knowledge of different experimental techniques for inspection of materials	5	Evaluating



<b>Course:</b>	<b>Process Calculations</b>	<b>Course Code:209344</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 1Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C244.1	Apply the various laws of governing solid, liquid, gas phases and knowledge of basic concepts.	3	Apply
C244.2	Calculate material balance for various unit operations (non-reacting system) in chemical engineering.	3	Calculate
C244.3	Calculate material balance for various unit processes (reacting system) in chemical engineering.	3	Calculate
C244.4	Calculate the energy requirement and derive the energy balance equation for various unit operations and processes in chemical engineering.	6	Calculate
C244.5	Formulate the material balance for various unit operations in chemical engineering.	6	Formulate
C244.6	Calculate the calorific values of fuel, air requirement and Compositions of flue gases in chemical industrial problems.	3	Calculate

<b>Course:</b>	<b>Industrial Chemistry</b>	<b>Course Code:209347</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 4Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C247.1	Apply the concept of naturally occurring polymer and synthesize the new polymers.	3	Apply
C247.2	Apply the theory of synthesis of complex and evaluate their properties	3	Apply
C247.3	Analyse the given chemical substance by different Instrumentation techniques.	3	Analyse
C247.4	Understand catalyst and its mechanism and apply it in the synthesis of compounds	2	Understand
C247.5	Understand concept of isomerism and analyse different isomers and their properties	2	Understand
C247.6	Understand mode of action of drug and pesticides and apply it in the synthesis of drug with desired properties	2	Understand





<b>Course:</b>	<b>Heat Transfer</b>	<b>Course Code:209348</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 2Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C248.1	Apply knowledge of basic concepts of Modes of Heat Transfer.	1	Remembering
C248.2	Apply knowledge of Heat Conduction	2	Understand
C248.3	Illustrate identify, formulate and solve engineering problems related to Convection	3	Applying
C248.4	Identify, formulate and solve engineering problems related to Radiation	3	Applying
C248.5	Identify heat exchange equipment appropriate for a given duty and to design the same	6	Creating
C248.6	Identify, formulate and solve engineering problems related to Evaporation.	5	Evaluating

<b>Course:</b>	<b>Principles of Design</b>	<b>Course Code:209349</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 2Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C249.1	Formulate and analyze stresses and strains in machine elements and structures subjected to various loads.	1	Formulate
C249.2	Apply multidimensional static failure criteria in the analysis and design of mechanical components.	4	Apply
C249.3	Analyze and design power transmission shafts carrying various elements like keys and couplings with geometrical features.	3	Analyze
C249.4	Analyze and design structural joints like riveted and welded joints.	3	Analyze
C249.5	Select appropriate belt drive arrangement and bearings for required service.	2	Select
C249.6	Design pressure vessels for variety of unit operations (absorption/stripping, distillation, extraction, adsorption, crystallization, chemical conversions etc.)	1	Design

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<b>Course:</b>	<b>Chemical Technology-I</b>	<b>Course Code:209350</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 1Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level 1	Descriptor
<b>C250.1</b>	Describe the Chemical industries-facts, Unit operation and unit process concepts, Chemical processing and role of chemical engineers.	2	<b>Describe</b>
<b>C250.2</b>	Describe various manufacturing processes used in chemical process industries.	2	<b>Describe</b>
<b>C250.3</b>	Understand major engineering problems encountered in chemical process industries.	3	<b>Understand</b>
<b>C250.4</b>	Determine process aspects like yield, byproducts formed, generation of waste.	3	<b>Determine</b>
<b>C250.5</b>	Draw and explain process flow diagrams for a given process.	6	<b>Design</b>
<b>C250.6</b>	Understand use of various equipment/instruments used in process Industry.	3	<b>Understand</b>

<b>Course:</b>	<b>Mechanical Operation</b>	<b>Course Code:209351</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 2Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C251.1</b>	Applying suitable type of screening and size reduction equipment for analysis of different particle sizes	3	Applying
<b>C251.2</b>	Select suitable type of thickeners and clarifiers for separation of Suspended solid particles.	5	Evaluating
<b>C251.3</b>	Apply fluidization and beneficiation techniques in chemical industries.	3	Applying
<b>C251.4</b>	Evaluate Mixing index and power consumption in mixing and agitation.	5	Evaluating
<b>C251.5</b>	Examine a suitable type of filter for filtration of slurry or a Suspension.	5	Evaluating
<b>C251.6</b>	Identify a suitable type of conveyor for transportation of Different types of solids.	6	Understand

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### T.E.Chemical Engineering

<b>Course:</b>	<b>Mass Transfer-I</b>	<b>Course Code:309341</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 4Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C341.1	Understand the General Principles of Mass Transfer, Classification, Methods and Design Principles of Mass Transfer.	1	Remembering
C341.2	Understand MTC and different Theories of Mass Transfer.	2	Understanding
C341.3	Determine mechanism of Gas Absorption, HETP , NTU, HTU concept	3	Applying
C341.4	Understand Vapor-Liquid equilibria ,basic definitions of Humidification terms, Psychrometric chart ,etc.	4	Analyzing
C341.5	Understand different Gas-Liquid contacting devices.	3	Applying
C341.6	Understand basic drying principles, types of moisture binding, mechanism of moisture movement in solid, rate of drying curve ,etc.	4	Analyzing

<b>Course:</b>	<b>Engineering Mathematics-III</b>	<b>Course Code:309343</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: --Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C343.1	Understand Problems on error and root equations	3	Understand
C343.2	Develop appropriate numerical methods to solve non-linear algebraic and linear system of equations and also Design of regression analysis and interpolation problem.	4	Develop
C343.3	Develop appropriate numerical methods to solve an ordinary differential equation.	4	Develop
C343.4	Develop appropriate numerical methods to solve Finite Difference Methods and Design Process optimization problems.	4	Develop

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<b>Course:</b>	<b>Chemical Engineering Thermodynamics II</b>	<b>Course Code:309344</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: --Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C344.1	Understand the basic parameters of solution.	2	Understanding
C344.2	Formulate and evaluate engineering problems related to solution.	6	Formulate
C344.3	Evaluate bubble point, Dew point and flash Calculation.	5	Evaluate
C344.4	Choose the thermodynamics consistency of VLE data.	5	Decide
C344.5	Evaluate the equilibrium constant	5	Evaluate
C344.6	Estimate the equilibrium composition of more than one chemical reaction occurs simultaneously.	3	Estimate

<b>Course:</b>	<b>Chemical Industry Management</b>	<b>Course Code:309345</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: --Hrs/Week</b>	

Course Outcomes (COs)		Bloom's Taxonomy	
Course Outcomes	Statements	Level	Descriptor
C345.1	Design critically assess planning function, strategic planning, organizing function	4	Design
C345.2	Develop economic and operations management concepts useful in the production process.	3	Develop
C345.3	Apply the project management tools in effective development and implementation of the businessactivities.	3	Apply
C345.4	Develop the entrepreneurial spirit and plan to start their own enterprise.	4	Develop
C345.5	Apply basic management principles.	3	Apply
C345.6	Apply basic management Law	3	Apply

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<b>Course:</b>	Computer Aided Chemical Engineering I	<b>Course Code:</b> 309346	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical /Tutorial Teaching Scheme:</b> --Hrs/Week	

<b>Course Outcomes</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C346.1</b>	To develop new programme in MS EXEL to solve Chemical Engineering problem	<b>L6</b>	Develop
<b>C346.2</b>	To design programme in C Language to solve Chemical Engineering problem	<b>L6</b>	Design
<b>C346.3</b>	To develop programme in MATLAB to solve Chemical Engineering problem	<b>L6</b>	Develop
<b>C346.4</b>	To design Algorithm for problem Statement	<b>L6</b>	Design

<b>Course:</b>	Seminar	<b>Course Code:</b> 309347	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme:</b> -	<b>Practical /Tutorial Teaching Scheme:</b> 01 Hrs/Week	

<b>Course Outcomes</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C347.1</b>	Conduct the literature survey and to identify and Formulate the engineering problem.	<b>L6</b>	Develop
<b>C347.2</b>	Apply the mathematical concepts, science concepts, engineering concepts, management principles and engineering tools necessary to solve the identified engineering problem.	<b>L6</b>	Design



<b>Course:</b>	<b>Chemical Reaction Engineering –I</b>	<b>Course Code:309348</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: -03</b>	<b>Practical /Tutorial Teaching Scheme: 04 Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C348.1</b>	Understand homogeneous reactions kinetics and mechanism.	2	Apply
<b>C348.2</b>	Analyze and Interpret the batch reactor data.	4	Analyze
<b>C348.3</b>	Design and develop the performance equation of homogeneous reactor.	6	Design
<b>C348.4</b>	Analyze and design the performance of parallel and series reactions.	4	Analyze
<b>C348.5</b>	Apply the effect of temperature and pressure on reaction kinetics.	3	Apply
<b>C348.6</b>	Design and develop of performance of Non ideal reactor.	6	Design

<b>Course:</b>	<b>Mass Transfer-II</b>	<b>Course Code:309349</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 4Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C349.1</b>	Analyze vapour-liquid equilibrium curves and various distillation methods	4	Analyzing
<b>C349.2</b>	Ability to calculate ideal equilibrium stages for binary mixtures using McCabe Thiele, Lewis –Sorel and Ponchon-savarit method to design distillation column	6	Creating
<b>C349.3</b>	Analyze single and Multistage Cross-current, Co-current and Counter-current liquid-liquid extraction processes to evaluate number of theoretical stages	4	Analyzing
<b>C349.4</b>	Evaluate number of stages required for separation by leaching and to understand various equipment's used for separation	5	Evaluating
<b>C349.5</b>	Understand equilibrium in adsorption and ion exchange process and different adsorption isotherms used	2	Understanding
<b>C349.6</b>	Analyze the solubility data to calculate the yield , Heat and mass balances in crystallization process and distinguish various types of equipments.	4	Analyzing

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<b>Course:</b>	Transport Phenomena	<b>Course Code:309350</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 2Hrs/Week</b>	

Course Outcomes (COs)		Bloom's Taxonomy	
Course Outcomes	Statements	Level	Descriptor
<b>C350.1</b>	Design fundamental transport equations that describe non steady-state heat and mass transfer.	6	Design
<b>C350.2</b>	Develop modelling thinking by relating a problem involving non steady-state heat and mass transfer with initial and boundary conditions	3	Develop
<b>C350.3</b>	Apply qualitatively a non steady-state physical process related to a given conduction or diffusion equation with corresponding initial and boundary conditions.	3	Apply
<b>C350.4</b>	Design non steady-state mass transfer including diffusion and bulk flow as well as simple cases of simultaneous heat and mass transfer.	6	Design

<b>Course:</b>	Process Instrumentation And Control	<b>Course Code:309350</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: --Hrs/Week</b>	

Course Outcomes	Statement	Bloom's Taxonomy	
		Level	Descriptor
<b>C351.1</b>	To understand the basic principles & importance of process control in industrial process plants	2	<b>Understanding</b>
<b>C351.2</b>	To classify and Categorize with diagram various temperature measuring Instruments	4	<b>Classify</b>
<b>C351.3</b>	To classify and Categorize with diagram various Pressure measuring Instruments	4	<b>Classify</b>
<b>C351.4</b>	To classify and Categorize with diagram various Level and Flow measuring Instruments	4	<b>Classify</b>
<b>C351.5</b>	To understand the use of block diagrams & the mathematical basis for the design of control systems	2	<b>Understanding</b>
<b>C351.6</b>	To understand the importance and apply of good instrumentation for the efficient design of process control loops for process engineering plants	2	<b>Understanding</b>

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<b>Course:</b>	Internship	<b>Course Code:309352</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Chemical Engineering</b>	<b>Theory Teaching Scheme: --Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 4 Hrs/Week</b>	

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C347.1</b>	Learn the basic concepts and apply the theoretical Knowledge in practical demonstration.	<b>1</b>	Learning
<b>C347.2</b>	Implement Project Planning in their Industrial In-plant Training Project work.	<b>3</b>	Applying
<b>C347.3</b>	Be capable of self-education and clearly understand the value of achieving Perfection in the respective industrial work.	<b>2</b>	Understanding
<b>C347.4</b>	Study the concept of Facility, Location & Layout & implement in their Industrial In-plant training work.	<b>2</b>	Understanding
<b>C347.5</b>	Understand the impact of engineering solutions and industrial safety in a global and social context.	<b>2</b>	Understanding
<b>C347.6</b>	Function on Multi-disciplinary teams and familiar with organizational behaviour and management	<b>3</b>	Applying

### B.E.Chemical Engineering

<b>Course:</b>	<b>Process Dynamics and Control</b>	<b>Course Code:409341</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: -- Hrs/Week		Practical /Tutorial Teaching Scheme: 4 Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C441.1</b>	Study the fundamentals of process dynamic and control	<b>1</b>	Study
<b>C441.2</b>	Design of feedback control systems.	<b>3</b>	Design
<b>C441.3</b>	Carry out Stability Analysis of feed-back systems.	<b>3</b>	Analysis
<b>C441.4</b>	Application of advanced control	<b>3</b>	Application





<b>Course:</b>	<b>Chemical Reaction Engineering-II</b>	<b>Course Code:409342</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: 3 Hrs/Week		Practical /Tutorial Teaching Scheme: - Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C442.1	Analyze the fluid-particle heterogeneous reaction and kinetics applies to design of packed bed and Fluidized bed reactor.	4	Analyse
C442.2	Analyze the kinetics of fluid-fluid reaction and apply to design of fluid-fluid contacting devices.	4	Analyse
C442.3	Apply the concept of adsorption isotherm for analyze the physical properties of catalyst and mechanism of deactivation of catalysis.	3	Apply
C442.4	Analysis of mass transfer with chemical reaction in porous catalyst.	4	Analyse
C442.5	Develop the rate equation and mechanism of the solid-catalyzed reaction.	6	Develop
C442.6	Examine the design of heterogeneous catalytic reactors and concept of biochemical reaction system.	3	Examine

<b>Course:</b>	Chemical Engineering Design	<b>Course Code:409343</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: 3 Hrs/Week		Practical /Tutorial Teaching Scheme :2Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C443.1	Design agitated reaction vessel using given process parameters	6	Creating
C443.2	Design of vessel supports by considering different loads on vessel and storage vessels for storing volatile and non-volatile liquids using given process conditions	6	Creating
C443.3	Design Heat Transfer Equipment's like Shell and Tube Heat exchanger, Double pipe Heat exchanger, Evaporator	6	Creating
C443.4	Choose and design variables in distillation column and methods for binary system for process industry	6	Creating

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<b>C443.5</b>	Develop Cornell's and Onda's method and design packed column for distillation and absorption operation	<b>6</b>	<b>Creating</b>
<b>C443.6</b>	Understand the design of pipe line and Pipe supports by considering fluid dynamic parameter	<b>2</b>	<b>Understanding</b>

<b>Course:</b>	<b>Environmental Engineering</b>	<b>Course Code:4093444</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: Hrs/Week		Practical /Tutorial Teaching Scheme :2Hrs/Week

<b>Course Outcomes</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C444.1</b>	Classify types of pollutions and illustrate pollution laws and standards	<b>6</b>	<b>Classify</b>
<b>C444.2</b>	Identify air Pollution-Sources, Effects and Measurement and apply Controlling Methods	<b>6</b>	<b>Identify</b>
<b>C444.3</b>	Differentiate types, sources and effects of water pollutants in wastewater and determine Wastewater characteristics	<b>6</b>	<b>Creating</b>
<b>C444.4</b>	Select and design the wastewater treatments to minimize water pollution	<b>6</b>	<b>Select</b>
<b>C444.5</b>	Apply tertiary wastewater Treatment and Solid Waste Management for its disposal	<b>6</b>	<b>Apply</b>



<b>Course:</b>	<b>Chemical Process Synthesis</b>	<b>Course Code:4093445</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: Hrs/Week		Practical /Tutorial Teaching Scheme :2Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C445.1	Understand the basic fundamental knowledge of chemical process design and development of new process.	2	Understand
C445.2	Choice of chemical reactor during synthesis of process.	3	Apply
C445.3	Select the various separator during synthesis of process	3	Ability
C445.4	Apply suitable concept of distillation sequencing heat integration and thermal coupling of distillation column and to understand the methodology of overall heat exchanger network and utilize	3	Apply
C445.5	Analyze the heat exchanger network and utilize	3	Analyze
C445.6	Explore the knowledge of overall safety and health in chemical process industry.	3	Analyze

<b>Course:</b>	<b>Project Stage-I</b>	<b>Course Code:4093446</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: Hrs/Week		Practical /Tutorial Teaching Scheme :4Hrs/Week

Course Outcomes	Statement	Bloom's Taxonomy	
		Level	Descriptor
C447.1	Conduct the research literature survey and to identify and formulate the engineering problem.	6	Formulate
C447.2	Apply the mathematical concepts, science concepts, engineering concepts, management principles and engineering tools necessary to solve the identified engineering problem.	3	Apply



<b>Course:</b>	<b>Process Modelling and Simulation</b>	<b>Course Code:4093449</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme:3 Hrs/Week		Practical /Tutorial Teaching Scheme :2Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C449.1	Apply the mathematical modelling and fundamental laws governing to the models.	3	Apply
C449.2	Formulate the model equation of fluid flow, heat and mass transfer systems.	6	Formulate
C449.3	Develop the model equation to various chemical reactor systems.	6	Develop
C449.4	Analysis and development of solutions of the model equations by applying different numerical methods.	4	Analyse

<b>Course:</b>	<b>Process Engineering Costing &amp; Plant Design</b>	<b>Course Code:4093450</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme:3 Hrs/Week		Practical /Tutorial Teaching Scheme :2Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C409350.1	Apply the knowledge of overall aspects of the Chemical Engineering Plant Design	3	Apply
C409350.2	Implement the various terms of cost engineering and analyze the engineering cost estimation of the chemical manufacturing process	4	Analysis
C409350.3	Apply Techniques for economic optimization and optimum design.	3	Apply
C409350.4	Apply network Techniques such as CPM and PERT for the Chemical Engineering Project management.	3	Apply

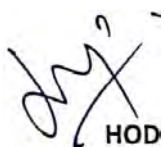
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<b>Course:</b>	Project Stage-II	<b>Course Code:4093453</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Chemical Engineering</b>	Theory Teaching Scheme: Hrs/Week		Practical /Tutorial Teaching Scheme :12Hrs/Week

Course Outcomes	Statements	Bloom's Taxonomy	
		Level	Descriptor
C453.1	Conduct the research literature survey and to identify and formulate the engineering problem.	6	Formulate
C453.2	Apply the mathematical concepts, science concepts, engineering concepts, management principles and engineering tools necessary to solve the identified engineering problem.	3	Apply
C453.3	Analyze and interpret results of experiments conducted on the designed solution(s) to arrive at valid conclusions	4	Analyze
C453.4	Demonstrate professionalism with ethics; present effective communication skills, writing skills and relate engineering issues to broader societal context	3	Demonstrate
C453.5	Apply the ethical principles, social benefits, environmental, health and safety issues, individual and team work and leadership knowledge.	3	Apply



HOD

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Principal  
Pravara Rural Engineering  
College, Loni





## Department of Computer Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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

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

Graduates (4-5 years after graduation) will demonstrate ability to,

- PEO1:** To work in a multidisciplinary environment by providing solutions to real time problems.
- PEO2:** To develop computer programmers on design and programming techniques, technologies and tools related to computer engineering.
- PEO3:** To inculcate, in students, professional and ethical attitude, effective communication skills, team work skill and ability to relate engineering issues in broader social context.

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

- PSO1:** The ability to understand, analyze and develop computer programs in the areas related to Algorithms, System Software, Machine Learning, Artificial Intelligence, Web Applications, Big Data Analytics and Networking for efficient design of computer-based systems of varying complexity
- PSO2:** The ability to apply standard practices and strategies in software / embedded project development using open-source programming tools and environment to deliver a quality product for business success
- PSO3:** The ability to employ modern computer language, environment and platforms in creating innovative career paths to be an entrepreneur and path for higher studies

  
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Department of Computer Engg.  
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Loni- 413 736

  
Principal  
Pravara Rural Engineering  
College, Loni



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Department of Computer Engineering  
Course Outcomes (2019 Pattern)

Course:	Discrete Mathematics	Course Code:210241	2019 Pattern	Sem-I
Class:	S.E. Computer Engineering	Theory Teaching Scheme: 3Hrs/Week		
Course Outcome Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C241.1	Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.	6	Formulate	
C241.2	Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.	3	Apply	
C241.3	Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.	4	Design	
C241.4	Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.	3	Apply	
C241.5	Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.	3	Calculate	
C241.6	Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.	3	Apply	

Course :	Fundamentals of Data Structures	Course Code: 210242	2019 Pattern	Sem-I
Class:	S.E. Computer Engineering	Theory Teaching Scheme: 3 Hrs/Week		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C242.1	Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.	6	Creating	

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C242.2	Discriminate the usage of various structures, Design/ Program/ Implement the appropriate data structures; use them in implementations of abstract data types and Identity the appropriate data structure in approaching the problem solution.	6	Creating
C242.3	Demonstrate use of sequential data structures- Array and Linked lists to store and process data.	2	Understanding
C242.4	Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application	2	Understanding
C242.5	Compare and contrast different implementations of data structures (dynamic and static).	4	Analyzing
C242.6	Understand, Implement and apply principles of data structures- stack and queue to solve computational problems.	2	Understanding

<b>Course:</b>	<b>Object Oriented Programming</b>	<b>Course Code: 210243</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C243.1	Apply, sequence, selection and iteration: classes & objects, inheritance, use of predefined classes from libraries while developing software.	3	Apply	
C243.2	Design object-oriented solutions for small systems involving multiple objects.	6	Design	
C243.3	Use virtual and pure virtual function and complex programming situations.	4	Use	
C243.4	Apply object-oriented software principles in problem solving.	3	Apply	
C243.5	Analyse the strengths of object-oriented programming.	4	Analyse	
C243.6	Develop the application using object-oriented programming language C++.	6	Develop	

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<b>Course:</b>	<b>Computer Graphics</b>	<b>Course Code:210244</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C244.1	Define basic terminologies of Computer Graphics, interpret the mathematical foundation of the concepts of computer graphics and apply mathematics to develop Computer programs for elementary graphic operations..	2	Define	
C244.2	Define the concept of windowing and clipping and apply various algorithms to fill and clip Polygons.	2	Define	
C244.3	Explain the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.	2	Explain	
C244.4	Explain the concepts of color models, lighting, shading models and hidden surface elimination.	2	Explain	
C244.5	Describe the fundamentals of curves, fractals, animation and gaming.	3	Describe	

<b>Course:</b>	<b>Digital Electronics and Logic Design</b>	<b>Course Code:210245</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C245.1	Simplify Boolean Expressions using K Map.	3	Apply	
C245.2	Design and implement combinational circuits.	3	Apply	
C245.3	Design and implement sequential circuits.	3	Apply	
C245.4	Develop simple real-world application using ASM and PLD.	3	Apply	
C245.5	Differentiate and choose appropriate logic families IC packages as per the given design specifications.	4	Analyze	
C245.6	Explain organization and architecture of computer system.	2	Understand	

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<b>Course:</b>	<b>Data Structures Lab</b>	<b>Course Code:210246</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>		<b>Practical Teaching Scheme: 4 Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C246.1	Use algorithms on various linear data structure using sequential organization to solve real life problems.	3	Applying	
C246.2	Analyze problems to apply suitable searching and sorting algorithm to various applications	4	Analyzing	
C246.3	Analyze problems to use variants of linked list and solve various real life problems.	4	Analyzing	
C246.4	Designing and implement data structures and algorithms for solving different kinds of problems.	6	Creating	

<b>Course:</b>	<b>Object Oriented Programming Lab</b>	<b>Course Code: 210247</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE Computer Engineering</b>		<b>Theory Teaching Scheme: 3Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C247.1	Understand and apply the concepts like Inheritance, Polymorphism, Exception Handling and Generic structures for implementing reusable programming codes.	3	Apply	
C247.2	Analyse the concept of file and apply it while storing and retrieving the data trump secondary storages	4	Analyse	
C247.3	Analyse and apply computer graphics algorithms for line circle drawing, scan conversion, and filing with the help of object-oriented programming concepts	4	Analyse	
C247.4	Understand the concept of windowing and clipping and apply various algorithms to fill and clip polygons	3	Apply	
C247.5	Apply logic to implement curves, fractals, animation and gaming programs.	3	Apply	

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<b>Course:</b>	<b>Digital Electronics Laboratory</b>	<b>Course Code:210248</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	--	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C248.1	Understand the working of digital electronic circuits.	2	Understand	
C248.2	Apply the knowledge to appropriate IC as per the design specifications.	3	Apply	
C248.3	Design and implement Sequential and Combinational digital circuits as per the specifications.	3	Apply	

<b>Course:</b>	<b>Business Communication. Skill</b>	<b>Course Code: 210249</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	---	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C249.1	Understand the SWOT	2	Understand	
C249.2	Summarize Personal & Career Goal setting – Shortterm & Long term	2	Understand	
C249.3	The student should able to write resume, application,report	2	Apply	
C249.4	The student should Apply skill for preparation ofinterview	3	Apply	
C249.5	The student should Understand Telephonic etiquettesEmail etiquettes	2	Understand	

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<b>Course:</b>	<b>Humanity and Social Science</b>	<b>Course Code:210250</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	---	<b>Tutorial: 1Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C250.1	Find of the various issues concerning humans and society.	1	Remember	
C250.2	Summerise about their responsibilities towards society.	2	Understand	
C250.3	Analyse about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.	4	Analyse	
C250.4	Understand the nature of the individual and the relationship between self and the community.	2	Understand	
C250.5	Understand major ideas, values, beliefs, and experiences that have shaped human history and cultures	2	Understand	

<b>Course:</b>	<b>EM-II</b>	<b>Course Code: 207003</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs/Week</b>	<b>Tutorial: 1Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C203.1	Solve Linear differential equations, essential in modelling and design of computer-based systems.	3	Apply	
C203.2	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	3	Apply	
C203.3	Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning	3	Apply	
C203.4	Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.	3	Apply	

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C203.5	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing	3	Apply
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<b>Course:</b>	<b>Data Structure and Algorithm</b>	<b>Course Code: 210252</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C252.1	Identify and articulate the complexity goals and benefits of a good hashing scheme for real- world applications.	4	Identify	
C252.2	Apply non-linear data structures for solving problems of various domain.	3	Apply	
C252.3	Design and specify the operations of a nonlinear- based abstract data type and implement them in a high-level programming language	3	Design	
C252.4	Analyze the algorithmic solutions for resource requirements and optimization	4	Analyze	
C252.5	Apply & Use efficient indexing methods and multiway search techniques to store and maintain data.	3	Apply	
C252.6	Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.	4	Analyze	

<b>Course:</b>	<b>Software Engineering</b>	<b>Course Code: 210253</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>SE Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C253.1	Analyze software requirements and formulate design solution for a software	4	Analyse	

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C253.2	Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns	6	Design
C253.3	Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development	3	Apply
C253.4	Model and design (L6) User interface and component-level	3	Design
C253.5	Identify and handle risk management and software configuration management	1	Identify
C253.6	Utilize knowledge of software testing approaches, approaches to verification and validation	3	Utilize

<b>Course:</b>	<b>Microprocessor</b>	<b>Course Code: 210254</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C254.1	Exhibit skill of assembly language programming for the Application.	1	Remembering
C254.2	Classify processor architecture.	2	Understanding
C254.3	Illustrate advanced features of 80386 microprocessor	2	Understanding
C254.4	Compare and contrast different processor modes	2	Understanding
C254.5	Use interrupts mechanism in applications.	6	Creating
C254.6	Differentiate between microprocessors and microcontrollers.	4	Analyzing

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<b>Course:</b>	<b>Principles of Programming Languages</b>	<b>Course Code: 210255</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Theory Teaching, Scheme: 3 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C255.1	Apply the basic principles of programming languages	3	Apply	
C255.2	Apply and Develop a program with Data representation and Computations	3	Apply	
C255.3	Apply and Develop programs using Object Oriented Programming language : Java	3	Apply	
C255.4	Develop application using inheritance, encapsulation, and polymorphism	3	Develop	
C255.5	Demonstrate Applet and Multithreading for robust application development	2	Demonstrate	
C255.6	Apply and Develop a simple program using basic concepts of Functional and Logical programmingparadigm	3	Apply	

<b>Course:</b>	<b>Data Structure and Algorithm lab</b>	<b>Course Code: 210256</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Practical: 04 Hrs/Week</b>		
<b>Course Outcome Code</b>		<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C256.1	Understand the ADT/libraries, hash tables and dictionary to design algorithms for a specific problem.	2	Understand	
C256.2	Choose most appropriate data structures and apply algorithms for graphical solutions of the problems	3	Apply	
C256.3	Apply and analyze non linear data structures to solve real world complex problems..	3	Apply	
C256.4	Apply and analyze algorithm design techniques for indexing, sorting, multi-way searching, fileorganization and compression.	3	Apply	

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C256.5	Analyze the efficiency of most appropriate datastructure for creating efficient solutions for engineering design situations.	4	Analyze
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<b>Course:</b>	<b>Microprocessor Laboratory</b>	<b>Course Code:210257</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course Outcome Code</b>		<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C257.1	Understand and apply various addressing modes and instruction set to implement assembly language programs	2,	Understand	
C257.2	Apply logic to implement code conversion	3	Applying	
C257.3	Analyze and apply logic to demonstrate processor mode of operation	3	Applying, Analyzing	

<b>Course:</b>	<b>PBL</b>	<b>Course Code:210258</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>	<b>Practical Teaching Scheme: 4Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C258.1	Identify the real life problem from societal need point of view	1	identify	
C258.2	Choose and compare alternative approaches to select most feasible one	2	Choose, compare	
C258.3	Analyze and synthesize the identified problem from technological perspective	4	Analyze	
C258.4	Design the reliable and scalable solution to meet challenges	3	Design	
C258.5	Evaluate the solution based on the criteria specified	5	Evaluate	
C258.6	Perceive long life learning attitude towards the societal problems	5	Perceive	

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<b>Course:</b>	<b>Code of conduct</b>	<b>Course Code:210259</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Computer Engineering</b>		<b>Practical Teaching Scheme: 1Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C259.1	Understand the basic perception of profession, professional ethics, various moral and social issues, industrial standards, code of ethics and role of professional ethics in engineering field.	2	Understand	
C259.2	Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.	2	Understand	
C259.3	Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development	2	Understand	
C259.4	Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.	2	Understand	

<b>Course:</b>	<b>Database Management Systems</b>	<b>Course Code: 310241</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C341.1	Analyze and design Database Management System using ER model	4	Analyze	
C341.2	Implement database queries using database languages	3	Apply	
C341.3	Normalize the database design using normal forms	3	Apply	
C341.4	Apply Transaction Management concepts in real-time situations	4	Analyze	

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C341.5	Use No SQL databases for processing unstructured data	3	Apply
C341.6	Differentiate between Complex Data Types and analyze the use of appropriate data types	2	Understand

<b>Course:</b>	<b>Theory Of Computation</b>	<b>Course Code: 310242</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C342.1	Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants	1	Understand	
C342.2	Construct regular expression to present regular language and understand pumping lemma for RE	3	Apply	
C342.3	Design Context Free Grammars and learn to simplify the grammar.	6	Create	
C342.4	Construct Pushdown Automaton model for the Context Free Language.	3	Apply	
C342.5	Design Turing Machine for the different requirements outlined by theoretical computer science.	3	Design	

<b>Course:</b>	<b>Systems Programming and Operating System</b>	<b>Course Code:310243</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C343.1	Analyze and synthesize basic System Software and its functionality	4	Analyze	
C343.2	Identify suitable data structures and Design & Implement various System Software	4	Identify	
C343.3	Compare different loading schemes and analyze the performance of linker and loader	2	Compare	

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C343.4	Implement and Analyze the performance of process scheduling algorithms	4	Implement
C343.5	Identify the mechanism to deal with deadlock and concurrency issues	4	Identify
C343.6	Demonstrate memory organization and memory management policies	2	Demonstrate

<b>Course:</b>	<b>Computer Network &amp; Security</b>	<b>Course Code:310244</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 4Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C344.1	Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies.	2	Understand	
C344.2	Illustrate the working and functions of data link layer.	4	Analyze	
C344.3	Analyze the working of different routing protocols and Mechanisms.	4	Analyze	
C344.4	Implement client-server applications using sockets.	3	Apply	
C344.5	Illustrate role of application layer with its protocols, client-server architectures.	4	Analyze	
C344.6	Comprehend the basics of Network Security.	2	Understand	

<b>Course:</b>	<b>Software Project Management</b>	<b>Course Code: (310245D)</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs / Week</b>	<b>Practical Teaching Scheme: 4 Hrs / Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C345D.1	Comprehend project management concepts.	2	Understand	
C345D.2	Use various tools of software project management	3	Applying	
C345D.3	Schedule various activities in software projects.	3	Applying	

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C345D.4	Track a project and manage changes.	4	Analyzing,
C345D.5	Apply agile project management.	3	Applying
C345D.6	Analyses staffing process for team building and decision making in software projects and management.	4	Analyzing

<b>Course:</b>	<b>DBMS Lab</b>	<b>Course Code:310246</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 4Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C346.1	Design E-R Model for given requirements and convert the same into database tables	6	design	
C346.2	Design schema in appropriate normal form considering actual requirements	6	create	
C346.3	Experiment with SQL queries for given requirements , using different SQL concepts	3	Apply	
C346.4	Experiment with PL/SQL Code block for given requirements	3	Apply	
C346.5	Experiment with NoSQL queries using MongoDB	3	Apply	
C346.6	Design and develop application considering actual requirements and using database concepts	6	Create	

<b>Course:</b>	<b>Computer Network &amp; Security Lab</b>	<b>Course Code:310247</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 4Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C347.1	Analyze the requirements of network types, topology and transmission media	4	Analyze	
C347.2	Experiment with error control, flow control techniques and protocols and analyze them	3	Apply	

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C347.3	Experiment with the subnet formation with IP allocation mechanism and apply various routing algorithms	3	Apply
C347.4	Develop Client-Server architectures and prototypes	3	Apply
C347.5	Develop web applications and services using application layer protocols	3	Apply
C347.6	Use network security services and mechanisms	3	Apply

<b>Course:</b>	<b>Laboratory Practice-I</b>	<b>Course Code:310248</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer</b>	<b>Practical:4Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C348.1	Implement language translators	3	Implement	
C348.2	Use & Implement tools like LEX and YACC	3	Implement	
C348.3	Implement internals and functionalities of Operating System	3	Implement	
C348.4	Design IoT and Embedded Systems based application	6	Design	
C348.5	Develop smart applications using IoT	6	Develop	
C348.6	Develop IoT applications based on cloud environment	6	Develop	

<b>Course:</b>	<b>Seminar and Tech Comm.</b>	<b>Course Code:310249</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Practical: 1Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C349.1	Analyze a latest topic of professional interest	4	Analyze	

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C349.2	Improve technical writing skills	3	Improve
C349.3	Identify an engineering problem, analyze it and propose a work plan to solve it	4	Analyse
C349.4	Adapt with professional technical presentation skills	6	Adapt

Course:	Data Science and Big Data Analytics	Course Code:310251	2019 Pattern	Sem-II
Class:	T.E. Computer Engineering	Theory Teaching Scheme: 3Hrs/Week		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C351.1	Analyze needs and challenges for Data Science Big Data Analytics	4	Analyze	
C351.2	Apply statistics for Big Data Analytics	3	Apply	
C351.3	Explain the lifecycle of Big Data analytics for real world problems	2	Understand	
C351.4	Illustrate Big Data Analytics using Python programming	2	Understand	
C351.5	Illustrate Data Visualization using visualization tools in Python programming	2	Understand	
C351.6	Explain the Hadoop ecosystem	2	Understand	

Course:	Web Technology	Course Code:310252	2019 Pattern	Sem-II
Class:	T.E. Computer Engineering	Practical Teaching Scheme: 3Hrs/Week		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C352.1	Implement and analyze behavior of web pages using HTML and CSS	3	Apply	
C352.2	Apply the client-side technologies for web development	3	Apply	
C352.3	Analyze the concepts of Servlet and JSP	4	Analyze	

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C352.4	Analyze the Web services and frameworks	4	Analyze
C352.5	Apply the server-side technologies for web development	3	Apply
C352.6	Create the effective web applications for business functionalities using latest web development platforms	4	Analyze

<b>Course:</b>	<b>Artificial Intelligence</b>	<b>Course Code:310253</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C353.1	Identify and apply suitable Intelligent agents for various AI applications	3	Apply
C353.2	Build smart system using different informed search /uninformed search or heuristic approaches	6	Build
C353.3	Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem	4	Identify
C353.4	Apply the suitable algorithms to solve AI problems	3	Apply
C353.5	Show ideas underlying modern logical inference systems	2	Understand

<b>Course:</b>	<b>Cloud Computing</b>	<b>Course Code: 310254 C</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>TE Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs/Week</b>		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C354.1	Understand the different cloud computing environments	2	Understand	
C354.2	Use appropriate data storage technique on cloud based on cloud applications	3	Use	

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C354.3	Analyse virtualization technology and install virtualization software	4	Analyse
C354.4	Develop and deploy applications on cloud	4	Develop
C354.5	Apply security in cloud applications	3	Apply
C354.6	Use advanced techniques in cloud computing	3	Use

<b>Course:</b>	<b>Internship</b>	<b>Course Code: 310255</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Theory Teaching Scheme: --</b>	<b>Practical Teaching Scheme: --</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
C355.1	To demonstrate professional competence through Industry internship.		2	Understand
C355.2	To apply knowledge gained through internships to complete academic activities in a professional Manner.		3	Apply
C355.3	To choose appropriate technology and tools to solve given problem.		1	Remember
C355.4	To demonstrate abilities of a responsible professional and use ethical practices in day to day life.		2	Understand
C355.5	Creating network and social circle, and developing relationships with industry people.		6	Create
C355.6	To analyze various career opportunities and decide carrier goals.		4	Analyze

<b>Course:</b>	<b>Data Science and Big Data Analytics Lab</b>	<b>Course Code:310256</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Practical Scheme: 4Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
C356.1	Apply principles of Data Science for the analysis of real time problems		3	Apply
C356.2	Experiment with data representation using statistical methods		3	Apply

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C356.3	Experiment with and evaluate data analytics algorithms	3	Apply
C356.4	Experiment with text preprocessing techniques	3	Apply
C356.5	Experiment with data visualization techniques	3	Apply
C356.6	Use cutting edge tools and technologies to analyze Big Data	3	Apply

<b>Course:</b>	<b>Web Technology Laboratory</b>	<b>Course Code:310257</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Practical Teaching Scheme: 2 Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C357.1	Understand the importance of website planning and website design issues	2	Understand	
C357.2	Apply the client side and server-side technologies for web application development	3	Apply	
C357.3	Analyze the web technology languages, frameworks and services	4	Analyze	
C357.4	Create three tier web-based applications	4	Analyze	

<b>Course:</b>	<b>LP-II</b>	<b>Course Code:310258</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Computer Engineering</b>	<b>Practical Teaching Scheme: 4 Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C358.1	Design a system using different informed search / uninformed search or heuristic approaches	6	Design	
C358.2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning	3	Apply	
C358.3	Design and develop an interactive AI application	6	Design	

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C358.4	Use tools and techniques in the area of Information Security	3	Apply
C358.5	Use the cryptographic techniques for problem solving	3	Apply
C358.6	Design and develop security solution.	6	Design

<b>Course:</b>	<b>Design and Analysis of Algorithms</b>	<b>Course Code: 410241</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C441.1	Formulate the problem	3	Formulate	
C441.2	Analyze the asymptotic performance of algorithms	4	Analyze	
C441.3	Decide and apply algorithmic strategies to solve given problem	5	Decide	
C441.4	Find optimal solution by applying various methods	1	Find	
C441.5	Analyze and Apply Scheduling and Sorting Algorithms.	4	Analyze	
C441.6	Solve problems for multi-core or distributed or concurrent environments	3	Solve	

<b>Course:</b>	<b>Machine Learning</b>	<b>Course Code: (410242)</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C442.1	Identify the needs and challenges of machine learning for real time applications	2	Understand	
C442.2	Apply various data pre-processing techniques to simplify and speed up machine learning algorithms.	3	Apply	
C442.3	Select and apply appropriately supervised machine learning algorithms for real time applications.	3	Apply	
C442.4	Implement variants of multi-class classifier and measure its performance.	3	Apply	

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C442.5	Compare and contrast different clustering algorithms.	4	Analyze
C442.6	Design a neural network for solving engineering problems.	6	Create

<b>Course:</b>	<b>Block chain Technology</b>	<b>Course Code:</b> 410243	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: TH: 03 Hours/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C443.1	Interpret the fundamentals and basic concepts in Block chain	2	Understand	
C443.2	Compare the working of different block chain platforms	2	Understand	
C443.3	Use Crypto wallet for cryptocurrency based transactions	3	Apply	
C443.4	Analyze the importance of block chain in finding the solution to the real-world problems	4	Analyze	
C443.5	Illustrate the Ethereum public block chain platform	2	Understand	
C443.6	Identify relative application where block chain technology can be effectively used and implemented	3	Apply	

<b>Course:</b>	<b>Cyber Security and Digital Forensics</b>	<b>Course Code:410244(C)</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C444.1	Analyze threats in order to protect or defend it in Cyberspace from cyber-attacks.	4	Analyze	
C444.2	Build appropriate security solutions against cyber-attacks.	3	Build	
C444.3	Underline & Explain the need of digital forensic and role of digital evidences.	2	Explain	
C444.4	Explain rules and types of evidence collection	2	Explain	
C444.5	Analyze, validate and process crime scenes	4	Analyze	
C444.6	Identify the methods to generate legal evidence and Supporting investigation reports.	3	Identify	

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<b>Course:</b>	<b>Software Testing &amp; Quality Assurance</b>	<b>Course Code: 410245 D</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level I</b>	<b>Descriptor</b>	
C445D.1	Describe fundamental concepts in software testing such as manual testing automation testing and software quality assurance	2	Describe	
C445D.2	Design and develop project test plan design test cases test data and conduct test operations	4	Develop	
C445D.3	Apply recent automation tool for various software testing for testing software	3	Apply	
C445D.4	Apply different approaches of quality management assurance and quality standard to software system	3	Apply	
C445D.5	Apply and analyse effectiveness of software quality tools	4	Analyse	
C445D.6	Apply tools necessary for efficient testing framework	3	Apply	

<b>Course:</b>	<b>Information Retrieval</b>	<b>Course Code:410245 (Ele-IV-A)</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 4 Hrs./Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C445A.1	Implement the concept of Information Retrieval.	3	Apply	
C445A.2	Generate quality information out of retrieved Information.	4	Analyze	
C445A.3	Apply techniques such as classification, clustering, and filtering over multimedia to analyze the information	3	Apply	
C445A.4	Evaluate and analyze retrieved information.	4	Analyze	
C445A.5	Understand the data in various Application and Extensions of information retrieval.	2	Understand	
C445A.6	Understand Parallel information retrieving and web Structure.	2	Understand	

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Course:	Laboratory Practice III	Course Code:(410246)	2019 Pattern	Sem-I
Class:	B.E. Computer Engineering	Practical Teaching Scheme: 4Hrs/Week		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C446.1	Apply preprocessing techniques on datasets.	3	Apply	
C446.2	Implement and evaluate linear regression and random forest Regression models.	3	Apply	
C446.3	Apply and evaluate classification and clustering techniques.	3	Evaluate	
C446.4	Analyze performance of an algorithm.	4	Analyze	
C446.5	Implement an algorithm that follows one of the following algorithm design strategies: divide and conquer, greedy, Dynamic programming, backtracking, branch and bound.	3	Apply	
C446.6	Interpret the basic concepts in Block chain technology and its applications	3	Apply	

Course:	Laboratory Practice IV	Course Code:(410247)	2019 Pattern	Sem-I
Class:	B.E. Computer Engineering	Practical Teaching Scheme: 4Hrs/Week		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C447.1	Apply android application development for solving real life problems	3	Apply	
C447.2	Design and develop system using various multimedia components	6	design	
C447.3	Identify various vulnerabilities and demonstrate using various tools	2	demonstrate	
C447.4	Apply information retrieval tools for natural language processing	3	Apply	
C447.5	Apply an application using open source GPU programming languages	3	Apply	
C447.6	Apply software testing tools to perform automated testing	3	Apply	

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<b>Course:</b>	<b>Project Work Stage I</b>	<b>Course Code:410248</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Practical Teaching ,Scheme: 2 Hrs./Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C448.1	Solve real life problems by applying knowledge	3	Apply	
C448.2	Analyze alternative approaches, apply and use most appropriate one for feasible solution	4	Analyze	
C448.3	Write precise reports and technical documents	2	Understand	
C448.4	Present their work in written and oral forms with ethical values	4	Analyze	

<b>Course:</b>	<b>High Performance Computing</b>	<b>Course Code: 410250</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E.Computer Engineering</b>	<b>Theory Teaching Scheme: 4Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C450.1	Understand various Parallel Paradigm	2	Understand	
C450.2	Design and Develop an efficient parallel algorithm to solve given problem	5	Design	
C450.3	Illustrate data communication operations on various parallel architecture	2	Illustrate	
C450.4	Analyze and measure performance of modern parallel computing systems	4	Analyze	
C450.5	Apply CUDA architecture for parallel programming	3	Apply	
C450.6	Analyze the performance of HPC applications	4	Analyze	

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<b>Course:</b>	<b>Deep Learning</b>	<b>Course Code: 410251</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C451.1	The basics of Deep Learning and apply the tools to implement deep learning applications	2	Understand	
C451.2	The performance of deep learning models	5	Evaluate	
C451.3	The technique of Convolution (CNN) and Recurrent Neural Network (RNN) for implementing Deep Learning models	3	Apply	
C451.4	To implement and apply deep generative models.	3	Apply	
C451.5	Construct on-policy reinforcement learning algorithms	4	Analyze	
C451.6	To Understand Reinforcement Learning Process	2	Understand	

<b>Course:</b>	<b>Natural Language Processing</b>	<b>Course Code:410252(A)</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C452A.1	Describe the fundamental concepts of NLP, challenges and issues in NLP	1	Remembering	
C452A.2	Analyze Natural languages morphologically, syntactical and semantically OR describe the concepts of morphology, syntax, semantics of natural language	4	Analyzing	
C452A.3	Illustrate various language modelling techniques	2	Illustrating	
C452A.4	Integrate the NLP techniques for the information retrieval task	6	Creating	
C452A.5	Demonstrate the use of NLP tools and techniques for text-based processing of natural languages.	3	Applying	
C452A.6	Develop real world NLP applications	4	Creating	

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<b>Course:</b>	<b>Image Processing</b>	<b>Course Code: (410252B)</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs / Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C452B.1	Apply relevant mathematics required for digital image processing.	3	Applying	
C452B.2	Apply spatial and frequency domain method for image enhancement.	3	Applying	
C452B.3	Apply algorithmic approaches for image segmentation.	3	Applying	
C452B.4	Summarize the concept of image compression and Object recognition.	2	Understanding	
C452B.5	Explore the image restoration techniques.	4	Analyzing	
C452B.6	Explore the medical and satellite image processing applications.	4	Analyzing	

<b>Course:</b>	<b>Pattern Recognition</b>	<b>Course Code:410253 (Elective-VI-A)</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Theory Teaching Scheme: 3 Hrs./Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C453A.1	Analyze various type of pattern recognition techniques	4	Analyze	
C453A.2	Identify and apply various pattern recognition and classification approaches to solve the problems	3	Apply	
C453A.3	Evaluate statistical and structural pattern recognition	3	Apply	
C453A.4	Percept recent advances in pattern recognition confined to various applications	4	Analyze	
C453A.5	Implement Bellman's optimality principle and dynamic programming	3	Apply	
C453A.6	Analyze Patterns using Genetic Algorithms & Pattern Recognition applications.	4	Analyze	

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<b>Course:</b>	<b>Laboratory Practice- V</b>	<b>Course Code:(410254)</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course OutcomesCode</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C454.1	Analyze and measure performance of sequential and parallel algorithms.	4	Analyze	
C454.2	Design and Implement solutions for Multicore/Distributed/parallel environment.	3	Implement	
C454.3	Identify and apply the suitable algorithms to solve AI/ML problems.	2	Analyze	
C454.4	Apply the technique of Deep Neural network for implementing Linear regression and classification	3	Apply	
C454.5	Apply the technique of Convolution (CNN) for implementing Deep Learning models.	3	Apply	

<b>Course:</b>	<b>Laboratory Practice-VI</b>	<b>Course Code:410255</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Computer Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
C455.1	Apply basic principles of elective subjects to problem solving and modeling.	3	Applying	
C455.2	Use tools and techniques in the area of software development to build mini projects	6	Creating	
C455.3	Design and develop applications on subjects of their choice.	3	Applying	
C455.4	Generate and manage deployment, administration & Security.	6	Creating	

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Course:	Project Work Stage II	Course Code:410256	2019 Pattern	Sem-II
Class:	B.E. Computer Engineering	Practical Teaching Scheme: 6 Hrs./Week		
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C456.1	Show evidence of independent investigation.	4	Analyze	
C456.2	Critically analyze the results and their interpretation.	4	Analyze	
C456.3	Report and present the original results in an orderlyway and placing the open questions the right perspective.	2	Understand	
C456.4	Link techniques and results from literature as well as actual research and future research lines with the research.	4	Analyze	
C456.5	Appreciate practical implications and constraints of the Specialist subject.	2	Understand	

  
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## Department of Information Technology

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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

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

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** Possess strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges.

**PEO2:** Possess knowledge and skills in the field of Computer Science and Information Technology for analyzing, designing and implementing complex engineering problems of any domain with innovative approaches.

**PEO3:** Possess an attitude and aptitude for research, entrepreneurship and higher studies in the field of Computer Science and Information Technology.

**PEO4:** Have commitment to ethical practices, societal contributions through communities and life-long learning.

**PEO4:** Possess better communication, presentation, time management and teamwork skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level.

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

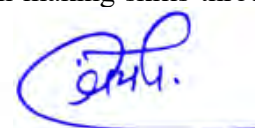
**PSO1:** An ability to apply the theoretical concepts and practical knowledge of Information Technology in analysis, design, development and management of information processing systems and applications in the interdisciplinary domain.

**PSO2:** ability to analyze a problem, and identify and define the computing infrastructure and operations requirements appropriate to its solution. IT graduates should be able to work on large-scale computing systems.

**PSO3:** An understanding of professional, business and business processes, ethical, legal, security and social issues and responsibilities.

**PSO4:** Practice communication and decision-making skills through the use of appropriate technology and be ready for professional responsibilities.

  
Dr. S.K. Konde  
HOD  
Head of Department  
Information Technology  
Pravara Rural Engineering  
College, Loni

  
Principal  
Pravara Rural Engineering  
College, Loni



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**Department of Information Technology**  
**SE IT Course Outcomes (2019 Pattern)**

<b>Course:</b>	<b>Engineering Mathematics III</b>	<b>Course Code:207003</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C203.1</b>	Solve Linear differential equations, essential in modelling and design of computer-based systems.	3	Apply	
<b>C203.2</b>	Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.	3	Apply	
<b>C203.3</b>	Apply Statistical methods like correlation & regression analysis and probability theory for data analysis and predictions in machine learning.	, 3	Apply	
<b>C203.4</b>	Solve Algebraic & Transcendental equations and System of linear equations using numerical techniques.	3	Apply	
<b>C203.5</b>	Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.	3	Apply	

<b>Course:</b>	<b>Discrete Mathematics</b>	<b>Course Code:214441</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C241.1</b>	Formulate and apply formal proof techniques and solve the problems with logical reasoning.	3	Apply	
<b>C241.2</b>	Analyze and evaluate the combinatorial problems by using probability theory.	4	Analyze	
<b>C241.3</b>	Apply the concepts of graph theory to devise mathematical models.	3	Apply	
<b>C241.4</b>	Analyze types of relations and functions to provide solution to computational problems.	4	Analyze	
<b>C241.5</b>	Identify techniques of number theory and its application.	2	Understand	
<b>C241.6</b>	Identify fundamental algebraic structures.	2	Understand	



<b>Course:</b>	<b>Logic Design &amp; Computer Organization</b>	<b>Course Code:214442</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C242.1</b>	Perform basic binary arithmetic & simplify logic expressions.	3	Apply	
<b>C242.2</b>	Grasp the operations of logic ICs and Implement combinational logic functions using ICs.	3	Apply	
<b>C242.3</b>	Comprehend the operations of basic memory cell types and Implement sequential logic functions using ICs.	3	Apply	
<b>C242.4</b>	Elucidate the functions & organization of various blocks of CPU.	2	Understand	
<b>C242.5</b>	Understand CPU instruction characteristics, enhancement features of CPU.	2	Understand	
<b>C242.6</b>	Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices	2	Understand	

<b>Course:</b>	<b>Data Structure &amp; Algorithms</b>	<b>Course Code:214443</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C243.1</b>	Perform basic analysis of algorithms with respect to time and space complexity.	4	Analyze	
<b>C243.2</b>	Select appropriate searching and/or sorting techniques in the application development.	3	Apply	
<b>C243.3</b>	Implement abstract data type (ADT) and data structures for given application.	3	Apply	
<b>C243.4</b>	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.	6	Create	
<b>C243.5</b>	Apply implement learned algorithm design techniques and data structures to solve problems.	3	Apply	
<b>C243.6</b>	Design different hashing functions and use files organizations.	6	Create	



<b>Course:</b>	<b>Object-Oriented Programming</b>	<b>CourseCode:214444</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C244.1</b>	Differentiate various programming paradigms.	4	Analyze	
<b>C244.2</b>	Identify classes, objects, methods, and handle object creation, initialization, and Destruction to model real-world problems.	3	Apply	
<b>C244.3</b>	Identify relationship among objects using inheritance and polymorphism principles.	3	Apply	
<b>C244.4</b>	Handle different types of exceptions and perform generic programming.	6	Create	
<b>C244.5</b>	Use of files for persistent data storage for real world application.	3	Apply	
<b>C244.6</b>	Apply appropriate design patterns to provide object-oriented solutions.	6	Create	

<b>Course:</b>	<b>Basics of Computer Network</b>	<b>CourseCode:214445</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C245.1</b>	Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.	2	Understand	
<b>C245.2</b>	Analyze data link layer services, error detection and correction, linear block codes, cyclic Codes, framing and flow control protocols.	4	Analyze	
<b>C245.3</b>	Compare different access techniques, channelization and IEEE standards.	4	Analyze	
<b>C245.4</b>	Apply the skills of sub netting, supernetting and routing mechanisms.	3	Apply	
<b>C245.5</b>	Differentiate IPv4 and IPv6.	2	Understand	
<b>C245.6</b>	Illustrate services and protocols used at transport layer.	2	Understand	





<b>Course:</b>	<b>Logic Design &amp; Computer Organization Lab</b>	<b>Course Code:314446</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C246.1</b>	Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.	3	Apply	
<b>C246.2</b>	Design Sequential Logic circuits: MOD counters using synchronous counters.	3	Apply	
<b>C246.3</b>	Understand the basics of simulator tool & to simulate basic blocks such as ALU & memory.	2	Understand	
<b>C246.4</b>	Understand the basics of Boolean Algebra and Logic Gates	2	Understand	

<b>Course:</b>	<b>Data Structure &amp; Algorithms Lab</b>	<b>Course Code:214447</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C247.1</b>	Analyze algorithms and to determine algorithm correctness and time efficiency class.	2	Analyze	
<b>C247.2</b>	Implement abstract data type (ADT) and data structures for given application.	2	Analyze	
<b>C247.3</b>	Design algorithms based on techniques like brute -force, divide and conquer, greedy, etc.).	5	Evaluate	
<b>C247.4</b>	Solve problems using algorithmic design techniques and data structures.	6	Create	
<b>C247.5</b>	Analyze of algorithms with respect to time and space complexity.	3	Apply	
<b>C247.6</b>	Evaluate user-interface design using HCI evaluation techniques.	5	Evaluate	



<b>Course:</b>	<b>Object Oriented Programming Lab</b>	<b>CourseCode:214448</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C248.1</b>	Differentiate various programming paradigms.	4	Analyze	
<b>C248.2</b>	Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.	3	Apply	
<b>C248.3</b>	Identify relationship among objects using inheritance and polymorphism.	6	Create	
<b>C248.4</b>	Handle different types of exceptions and perform generic programming.	3	Apply	
<b>C248.5</b>	Use file handling for real world application.	4	Analyze	
<b>C248.6</b>	Apply appropriate design patterns to provide object-oriented solutions.	5	Evaluate	

<b>Course:</b>	<b>Soft Skill Lab</b>	<b>Course Code:214449</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C249.1</b>	Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.	4	Evaluate	
<b>C249.2</b>	Develop effective communication skills including Listening, Reading, and Writing and Speaking.	3	Apply	
<b>C249.3</b>	Constructively participate in group discussion, meetings and prepare and deliver Presentations.	3	Apply	
<b>C249.4</b>	Write precise briefs or reports and technical documents.	3	Apply	
<b>C249.5</b>	Practice professional etiquette, present oneself confidently and successfully handle personal interviews .	3	Apply	
<b>C249.6</b>	Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of team work, Inter-personal relationships, conflict management and leadership quality.	4	Evaluate	



<b>Course:</b>	<b>Processor Architecture</b>	<b>Course Code:214451</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C251.1</b>	Apprehend architecture and memory organization of PIC 18 microcontroller.	2	Understand	
<b>C251.2</b>	Implement embedded C programming for PIC 18.	3	Apply	
<b>C251.3</b>	Use concepts of timers and interrupts of PIC 18.	3	Apply	
<b>C251.4</b>	Demonstrate real life applications using PIC 18.	3	Apply	
<b>C251.5</b>	Analyze architectural details of ARM processor.	4	Analyze	

<b>Course:</b>	<b>Database Management System</b>	<b>Course Code:214452</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C252.1</b>	Apply fundamental elements of database management systems.	3	Apply	
<b>C252.2</b>	Design ER-models to represent simple database application scenarios.	6	Create	
<b>C252.3</b>	Formulate SQL queries on data for relational databases.	3	Apply	
<b>C252.4</b>	Improve the database design by normalization & to incorporate query processing.	4	Analyze	
<b>C252.5</b>	Apply ACID properties for transaction management and concurrency control.	3	Apply	
<b>C252.6</b>	Analyze various database architectures and technologies	4	Analyze	



<b>Course:</b>	<b>Computer Graphics</b>	<b>Course Code:214453</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C253.1</b>	Apply mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines, circle, and apply it for problem solving.	3	Apply	
<b>C253.2</b>	Employ techniques of geometrical transforms to produce, position and manipulate Objects in 2 dimensional and 3-dimensional space respectively.	3	Apply	
<b>C253.3</b>	Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device	2	Understand	
<b>C253.4</b>	Apply concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.	3	Apply	
<b>C253.5</b>	Perceive the concepts of virtual reality.	2	Understand	

<b>Course:</b>	<b>Programming Skill Development Lab</b>	<b>Course Code:214455</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C255.1</b>	Apply concepts related to embedded C programming.	3	Apply	
<b>C255.2</b>	Develop and Execute embedded C program to perform array addition, block transfer, sorting operations	3	Apply	
<b>C255.3</b>	Perform interfacing of real-world input and output devices to PIC18FXXX	3	Apply	
<b>C255.4</b>	Use source prototype platform like Raspberry-Pi/Beagle board/Arduino.	3	Apply	





<b>Course:</b>	<b>Database Management System Lab</b>	<b>Course Code:214456</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C256.1</b>	Install and configure database systems.	3	Apply	
<b>C256.2</b>	Analyze database models & entity relationship models.	4	Analyze	
<b>C256.3</b>	Design and implement a database schema for a given problem-domain	6	Create	
<b>C256.4</b>	Implement relational database systems.	3	Apply	
<b>C256.5</b>	Populate and query a database using SQL DDL / DML / DCL commands.	3	Apply	
<b>C256.6</b>	Design a backend database of any one organization: CASE STUDY	6	Create	

<b>Course:</b>	<b>Computer Graphics Lab</b>	<b>Course Code:214457</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-02Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C257.1</b>	Apply line& circle drawing algorithms to draw the objects.	3	Apply	
<b>C257.2</b>	Apply polygon filling methods for the object.	3	Apply	
<b>C257.3</b>	Apply polygon clipping algorithms for the object.	3	Apply	
<b>C257.4</b>	Apply the 2D transformations on the object.	3	Apply	
<b>C257.5</b>	Implement the curve generation algorithms.	3	Apply	
<b>C257.6</b>	Demonstrate the animation of any object using animation principles.	6	Create	



<b>Course:</b>	<b>Project Based Learning</b>	<b>CourseCode:214458</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-04Hrs/Week</b>	
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C258.1</b>	Design solution to real life problems and analyze its concerns through shared cognition.	6	Create	
<b>C258.2</b>	Apply learning by doing approach in PBL to promote lifelong learning.	3	Apply	
<b>C258.3</b>	Tackle technical challenges for solving real world problems with team efforts.	3	Apply	
<b>C258.4</b>	Collaborate and engage in multi-disciplinary learning environments.	3	Apply	

### TE IT Course Outcomes (2019 Pattern)

<b>Course:</b>	<b>Outcomes Code:314441</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:T.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>	
<b>Course Outcomes</b>			
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C341.1</b>	Construct finite automata and its variants to solve computing problems.	3	Apply
<b>C341.2</b>	Write regular expressions for the regular languages and finite automata.	3	Apply
<b>C341.3</b>	Identify types of grammar, design and simplify Context Free Grammar.	4	Analyze
<b>C341.4</b>	Construct Pushdown Automata machine for the Context Free Language.	3	Apply
<b>C341.5</b>	Design and analyze Turing machines for formal languages.	4	Analyze
<b>C341.6</b>	Understand decidable and undecidable problems, analyze complexity classes.	4	Analyze



<b>Course:</b>	Operating System	<b>Outcomes Code:</b> 314442	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C342.1	Understanding the role of Modern Operating Systems.	2	Understand	
C342.2	Apply the concepts of process and thread scheduling.	3	Apply	
C342.3	Apply the concept of process synchronization, mutual exclusion and the deadlock.	3	Apply	
C342.4	Understand and apply the concepts of various memory management techniques.	2	Understand	
C342.5	Make use of concept of I/O management and File system.	3	Apply	
C342.6	Understand Important of System software.	2	Understand	

<b>Course:</b>	Machine Learning	<b>Course Code:</b> 314443	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C343.1	Apply basic concepts of machine learning and different types of machine learning algorithms.	2	Understand	
C343.2	Differentiate various regression techniques and evaluate their performance.	3	Apply	
C343.3	Compare different types of classification models and their relevant application.	3	Apply	
C343.4	Illustrate the tree-based and probabilistic machine learning algorithms.	2	Understand	
C343.5	Identify different unsupervised learning algorithms for the related real world problems.	3	Apply	
C343.6	Apply fundamental concepts of ANN.	3	Apply	



<b>Course:</b>	Human Computer Interaction	<b>Outcomes Code:</b> 314444	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C344.1	Explain importance of HCI study and principles of user-centered design (UCD) approach.	2	Understand	
C344.2	Develop understanding of human factors in HCI design.	3	Apply	
C344.3	Develop understanding of models, paradigms, and context of interactions.	3	Apply	
C344.4	Design effective user-interfaces following a structured and organized UCD process.	6	Create	
C344.5	Evaluate usability of a user-interface design.	4	Evaluate	
C344.6	Apply cognitive models for predicting human-computer-interactions.	3	Apply	

<b>Course:</b>	Elective -I : Advanced Database Management System	<b>Outcomes Code:</b> 314445(B)	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C345.1	Understand relational and object-oriented databases.	2	Understand	
C345.2	Learn and understand of parallel & distributed database architectures..	2	Understand	
C345.3	Learn the concepts of NoSQL Databases.	2	Understand	
C345.4	Understand data warehouse and OLAP technologies.	2	Understand	
C345.5	Apply data mining algorithms and to learn various software tools.	3	Apply	
C345.6	Learn emerging and enhanced data models for advanced applications.	2	Understand	





<b>Course:</b>	Operating Systems Lab	<b>Outcomes Code:</b> 314446	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C346.1</b>	Apply the basics of Linux commands.	3	Apply	
<b>C346.2</b>	Build shell scripts for various applications.	3	Apply	
<b>C346.3</b>	Implement basic building blocks like processes, threads under the Linux.	3	Apply	
<b>C346.4</b>	Develop various system programs for the functioning of OS concepts in user space like concurrency control, CPU Scheduling, Memory Management and Disk Scheduling in Linux.	6	Create	
<b>C346.5</b>	Develop system programs for Inter Process Communication in Linux.	6	Create	

<b>Course:</b>	Human Computer Interaction Laboratory	<b>Outcomes Code:</b> 414447	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C347.1</b>	Differentiate between good design and bad design.	4	Analyze	
<b>C347.2</b>	Analyze creative design in the surrounding.	4	Analyze	
<b>C347.3</b>	Assess design based on feedback and constraint.	5	Evaluate	
<b>C347.4</b>	Design paper-based prototypes and use wire frame.	6	Create	
<b>C347.5</b>	Implement user-interface design using web technology.	3	Apply	
<b>C347.6</b>	Evaluate user-interface design using HCI evaluation techniques.	5	Evaluate	



<b>Course:</b>	Laboratory Practice-I (ADBMS)	<b>Outcomes Code:</b> 314448(B)	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	TE	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C348.1	Understand Advanced Database Programming Languages.	2	Understand
C348.2	Master the basic concepts of NoSQL Databases.	2	Understand
C348.3	Install and configure database systems.	3	Apply
C348.4	Populate and query a database using MongoDB commands.	3	Apply
C348.5	Design data warehouse schema of any one real-time: CASE STUDYC	6	Create
C348.6	Develop small application with NoSQL Database for back-end.	5	Evaluate

<b>Course:</b>	Data Science and Big Data Analytics	<b>Outcomes Code:</b> 314452	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	T.E.IT	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:- 2Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C352.1	Understand Big Data primitives.	2	Understand
C352.2	Learn and apply different mathematical models for Big Data.	2	Understand
C352.3	Demonstrate Big Data learning skills by developing industry or research applications.	2	Understand
C352.4	Analyze and apply each learning model comes from a different algorithmic approach and it will perform differently under different datasets	2	Understand
C352.5	Understand, apply and analyze needs, challenges and techniques for big data visualization.	3	Apply
C352.6	Learn different programming platforms for big data analytics.	2	Understand



<b>Course:</b>	Web Application Development	<b>Outcomes Code:</b> 314453	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C353.1</b>	Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.	6	Create
<b>C353.2</b>	Demonstrate the use of web scripting languages.	3	Apply
<b>C353.3</b>	Develop web application with Front End & Back End Technologies.	6	Create
<b>C353.4</b>	Develop mobile website using JQuery Mobile.	6	Create
<b>C353.5</b>	Deploy web application on cloud using AWS.	6	Create

<b>Course:</b>	Elective-II (Cyber Security )	<b>Outcomes Code:</b> 314454(A)	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:- 2Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C354A.1</b>	To develop basic understanding of cyber security.	2	Understand
<b>C354A.2</b>	Differentiate among different types of cyber threats and cyber-crimes.	4	Analyze
<b>C354A.3</b>	Illustrate cyber forensic techniques to identify the criminal activities.	3	Apply
<b>C354A.4</b>	Apply forensic analysis tools to recover important evidence for identifying computer crime	3	Apply
<b>C354A.5</b>	Distinguish and classify the forms of cybercriminal activity and the technological and social engineering' methods used to undertake such crimes	4	Analyze
<b>C354A.6</b>	Evaluate the effectiveness of cyber-security, cyber-laws and other countermeasures against cybercrime	5	Evaluate



<b>Course:</b>	Elective –II (Software Modeling and Design )	<b>Outcomes Code:</b> 314454 (B )	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/W eek	<b>Practical Teaching Scheme:- 4Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C354B.1</b>	Understand basics of object oriented methodologies and Unified Modeling Language (UML).	2	Understand
<b>C354B.2</b>	Understand and apply analysis process, use case modeling, domain/class modeling	3	Apply
<b>C354B.3</b>	Design and apply interaction and behavior modeling on a given system.	5, 3	Apply
<b>C354B.4</b>	Comprehend OO design process and business, access and view layer class design.	2	Understand
<b>C354B.5</b>	Recognize the software design principles and patterns to be applied on system.	2	Understand
<b>C354.6</b>	Get started on study of architectural design principles and guidelines in the various type of application development.	2	Understand

<b>Course:</b>	Internship	<b>Outcomes Code:</b> 314455	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:- 4Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C355.1</b>	To develop professional competence through industry internship.	3	Apply
<b>C355.2</b>	To apply academic knowledge in a personal and professional environment	3	Apply
<b>C355.3</b>	To build the professional network and expose students to future employees.	6	Create
<b>C355.4</b>	To Apply professional and societal ethics in their day to day life.	3	Apply
<b>C355.5</b>	To become a responsible professional having social, economic and administrative considerations.	4	Apply
<b>C355.6</b>	To make own career goals and personal aspirations.	6	Create





<b>Course:</b>	Computer Network Security Lab	<b>Outcomes Code:</b> 314456	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C356.1</b>	Design and configure small size network and associated networking commands.	6	Create
<b>C356.2</b>	Understand various client/server environments to use application layer protocols.	2	Understand
<b>C356.3</b>	Use basic cryptographic techniques in software and system design.	3	Apply
<b>C356.4</b>	Apply methods for authentication, access control, intrusion detection.	3	Apply

<b>Course:</b>	DS & BDA Lab	<b>Outcomes Code:</b> 314457	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-02Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C357.1</b>	Apply Big data primitives and fundamentals for application development.	3	Apply
<b>C357.2</b>	Explore different Big data processing techniques with use cases.	4	Analyze
<b>C357.3</b>	Apply the Analytical concept of Big data using Python.	3	Apply
<b>C357.4</b>	Visualize the Big Data using Tableau.	3	Apply
<b>C357.5</b>	Design algorithms and techniques for Big data analytics.	6	Create
<b>C357.6</b>	Design and develop Big data analytic application for emerging trends.	6	Create



<b>Course:</b>	Laboratory Practice-II (Web Application Development)	<b>Outcomes Code:314458</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-04Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C358.1</b>	Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrap and AJAX.	6	Create	
<b>C358.2</b>	Create Version Control Environment.	6	Create	
<b>C358.3</b>	Develop an application using front end and backend technologies.	6	Create	
<b>C358.4</b>	Develop mobile website using JQuery Mobile.	6	Create	
<b>C358.5</b>	Deploy web application on cloud using AWS.	6	Create	

### BE IT Course Outcomes (2019 Pattern)

<b>Course:</b>	Information Storage and Retrieval	<b>CourseCode:414441</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:3Hrs/Week</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C441.1</b>	Understand the concept of Information retrieval and to apply clustering in information retrieval.	2	Understand	
<b>C441.2</b>	Apply Use an indexing approach for retrieval of text and multimedia data.	3	Apply	
<b>C441.3</b>	Evaluate performance of information retrieval systems.	5	Evaluate	
<b>C441.4</b>	Apply the concepts of multimedia and distributed information retrieval.	3	Apply	
<b>C441.5</b>	Apply Use appropriate tools in analyzing the web information	3	Apply	
<b>C441.6</b>	Create Simulate the working of a search engine and recommender system.	6	Create	



<b>Course:</b>	Software Project Management	<b>Course Code:</b> 414441	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-</b> 2Hrs/Week	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C442.1</b>	Apply the practices and methods for successful Software Project Management	3	Apply	
<b>C442.2</b>	Create Design and Evaluate Project	6	Create	
<b>C442.3</b>	Analyze Project Schedule and calculate Risk Management with help of tools.	5, 3	Analyze	
<b>C442.4</b>	Apply Demonstrate different tools used for Project Tracking, Monitoring & Control.	3	Apply	
<b>C442.5</b>	Understand Identify Staff Selection Process and the issues related to Staff Management.	2	Understand	
<b>C442.6</b>	Apply Discuss and use modern tools for Software Project Management.	3	Apply	

<b>Course:</b>	Deep Learning	<b>Course Code:</b> 414443	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-</b> 2Hrs/Week	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C443.1</b>	Understand the theoretical foundations, algorithms, and methodologies of Deep Learning.	2	Understand	
<b>C443.2</b>	Apply the concepts of Convolution Neural Networks and use of popular CNN architectures.	3	Apply	
<b>C443.3</b>	Compare Feed Forward Neural Network and Recurrent Neural Network and learn modeling the time dimension using RNN and LSTM.	5, 3	Analyze	
<b>C443.4</b>	Elaborate unsupervised deep learning algorithms like Auto encoders.	5	Analyze	
<b>C443.5</b>	Explore Representation Learning and Transfer Learning techniques using variants of CNN architecture.	5	Analyze	
<b>C443.6</b>	Evaluate the performance of deep learning algorithms real-world	6	Create	



<b>Course:</b>	Mobile Computing	<b>Course Code:</b> 41444	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C444.1	Understand the basic concepts of mobile computing, MAC and different multiplexing techniques.	2	Understand	
C444.2	Understand Protocols, Connection Establishment, Frequency Allocation, Routing of mobile telecommunication system like GSM, GPRS, UMTS.	3	Understand	
C444.3	Understand the Generations of Mobile Communication Technologies	3	Apply	
C444.4	Learn mobile IP , Adhoc – Network, Reactive Routing protocols, Multicast Routing.	2	Understand	
C444.5	Obtaining knowledge of transport layer protocol TCP, File System, and different application layer	2	Understand	
C444.6	To gain knowledge about different mobile platforms, operating Systems, Software Development Kit, Security Issues.	2	Understand	

<b>Course:</b>	Wireless Communication	<b>Course Code:</b> 41445	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C445.1	Articulate the fundamental concept of cellular system.	2	Understand	
C445.2	Analyse the fundamentals of cellular systems.	4	Analyze	
C445.3	Illustrate multiple access technique for effective utilization of spectrum.	2	Apply	
C445.4	Design and analyse the WAP Programming Model in networking environment.	5	Evaluate	
C445.5	Learn and understand security issues, challenges and tools in wireless communication.	2	Understand	
C445.6	Explore the emerging trends and applications in wireless communication.	4	Analyze	





<b>Course:</b>	Lab Practice III	<b>Course Code:</b> 414446	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-4Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C446.1</b>	CO1. Understand the concept of Information retrieval and to apply clustering in information retrieval.	2	Understand	
<b>C446.2</b>	CO2. Use appropriate indexing approach for retrieval of text and multimedia data. Evaluate performance of information retrieval systems.	3	Apply	
<b>C446.3</b>	CO3. Apply appropriate tools in analyzing the web information.	5, 3	Apply	
<b>C446.4</b>	CO4. Map the concepts of the subject on recent developments in the Information retrieval field.	5	Evaluate	

<b>Course:</b>	Lab Practice IV	<b>Course Code:</b> 414447	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C447.1</b>	Learn and Use various Deep Learning tools and packages.	3	Apply	
<b>C447.2</b>	Build and train a deep Neural Network models for use in various applications.	3	Apply	
<b>C447.3</b>	Apply Deep Learning techniques like CNN, RNN Auto encoders to solve real word Problems.	3	Apply	
<b>C447.4</b>	Evaluate the performance of the model build using Deep Learning.	5	Evaluate	



<b>Course:</b>	Project Stage I	<b>Course Code:</b> 41448	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C448.1</b>	To apply knowledge of mathematics, science, and engineering to formulate the Problem statement.	2	Understand	
<b>C448.2</b>	To design and conduct experiments, as well as to analyze and interpret data.	4	Analyze	
<b>C448.3</b>	Understand the professional and ethical responsibility.	2	Understand	
<b>C448.4</b>	To communicate effectively.	5	Evaluate	
<b>C448.5</b>	Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.	2	Understand	
<b>C448.6</b>	Recognition of the need for, and an ability to engage in life-long learning.	4	Analyze	

<b>Course:</b>	Elective VI (Business Analytics and Intelligence)	<b>Course Code:</b> 414452	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E.IT</b>	<b>Theory Teaching Scheme:</b> 3Hrs/Week	<b>Practical Teaching Scheme:-2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C452.1</b>	Apply conceptual knowledge on how Business Intelligence is used in decision making process	3	Apply	
<b>C452.2</b>	Use modelling concepts in Business Intelligence	3	Apply	
<b>C452.3</b>	Understand and apply the concepts of business reports and analytics with the help of visualization for business performance management	3	Apply	
<b>C452.4</b>	Comprehend the model-based decision making using prescriptive analytics	2	Understand	
<b>C452.5</b>	Analyze the role of analytics and intelligence in Business	4	Analyze	
<b>C452.6</b>	Comprehend different Business Intelligence trends and its future impacts	2	Understand	



Course:	Project-II	Course Code:414456	2019 Pattern	Sem-II
Class:	B.E.IT	Theory Teaching Scheme:3Hrs/Week	Practical Teaching Scheme:-	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C456.1	To apply engineering and mathematical knowledge to investigate / select proper technology / Algorithm suitable to solve the problem in hand.	3	Apply
C456.2	To apply knowledge of statistics for analysis of results and express conclusion and justification for the same.	3	Apply
C456.3	To design and conduct experiments, as well as to analyze and interpret data or develop prototype model of the application.	3	Apply
C456.4	To communicate effectively.	3	Apply
C456.5	Get broad education which is necessary to understand the impact of engineering solutions in a global, economic, environmental, ethically and societal context.	2	Understand
C456.6	Recognition of the need for, and an ability to engage in life-long learning.	5	Evaluate

  
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Head of Department  
Information Technology  
Pravara Rural Engineering  
College, Loni

  
Principal  
Pravara Rural Engineering  
College, Loni





## Department of Electronics and Computer Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

Approved by AICTE, New Delhi vide Letter No. F-27-29/91-AICTE/US (PG)/6717 Dt. 20/09/1993

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10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** Through effective teaching learning environment, the graduates will achieve a high level of technical competence in Electronics and Computer Engineering, so that they are able to develop solutions to the problems.

**PEO2:** Ability to work effectively in a multidisciplinary environment individually or in team at a global and societal level.

**PEO3:** Graduates will compete on a national, global platform to pursue their career in Electronics Engineering as well as in Computer Engineering and allied disciplines

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

**PSO1:** Ability to identify, analyse, design and develop applications in Electronics as well as in Computer field by using appropriate modern software, tools and techniques.

**PSO2:** Demonstrate the knowledge of modern software and techniques of electronics and computer engineering for the development of innovative applications needed at a global and societal level.

HoD

Head  
Department of Electronics and  
Computer Engineering,  
Pravara Rural Engineering College, Loni.

Principal  
Pravara Rural Engineering  
College, Loni



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**Department of Electronics and Computer Engineering**

**Course Outcomes (2019 Course)**

**S.E. Electronics and Computer Engineering**

<b>Course:</b>	<b>Engineering Mathematics III</b>	<b>Course Code: 207005</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 04 Hrs/Week</b>	<b>Tutorial Teaching Scheme: 01 Hr/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C205.1</b>	Solve higher order linear differential equations and its applications to engineering problems		3	Apply
<b>C205.2</b>	Solve problems related to Fourier transform, Z-transform and applications to Communication systems and Signal processing		1	Remember
<b>C205.3</b>	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.		2	Understand
<b>C205.4</b>	Perform vector differentiation and integration, analyze the vector fields and apply to Electro-Magnetic fields.		2	Understand
<b>C205.5</b>	Analyze conformal mappings, transformations and perform contour integration of complex functions in the study of electrostatics and signal processing		2	Understand

<b>Course:</b>	<b>Electronic Circuits</b>	<b>Course Code: 204202</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C202.1</b>	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier		2	Understand
<b>C202.2</b>	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications		3	Apply
<b>C202.3</b>	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies		4	Analyze



<b>C202.4</b>	Explain internal schematic of Op-Amp and define its performance parameters	2	Understand
<b>C202.5</b>	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications	3	Apply
<b>C202.6</b>	Understand and compare the principles of various data conversion techniques and PLL with their applications	2	Understand

<b>Course:</b>	<b>Digital Circuits</b>	<b>Course Code: 204182</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C282.1</b>	Discuss Classification and Characteristics of digital Logic Families.	2	Understand	
<b>C282.2</b>	Use the basic logic gates and various reduction techniques of digital logic circuits.	3	Apply	
<b>C282.3</b>	Analyze, design and implement combinational logic circuits.	4	Analyze	
<b>C282.4</b>	Analyze, design and implement sequential circuits.	4	Analyze	
<b>C282.5</b>	Differentiate between Mealy and Moore machines.	3	Apply	
<b>C282.6</b>	Analyze digital system design using PLD.	4	Analyze	

<b>Course:</b>	<b>Data structures &amp; Algorithms</b>	<b>Course Code: 204184</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C284.1</b>	Solve mathematical problems using C programming language.	3	Apply	
<b>C284.2</b>	Implement sorting and searching algorithms and calculate their complexity.	2	Understand	
<b>C284.3</b>	Develop applications of stack and queue using array.	3	Apply	
<b>C284.4</b>	Demonstrate applicability of Linked List.	3	Apply	
<b>C284.5</b>	Demonstrate applicability of nonlinear data structure – Binary Tree with respect to its time complexity.	3	Apply	
<b>C284.6</b>	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	3	Apply	



<b>Course:</b>	<b>Computer Organization</b>	<b>Course Code: 204203</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C203.1</b>	Understand computer architecture concepts related to design of modern processors, Memories and I/Os.	2	Understand	
<b>C203.2</b>	Understand the principles of computer architecture using examples drawn from commercially available computers	2	Understand	
<b>C203.3</b>	Remember Various design alternatives in processor organization.	1	Remember	

<b>Course:</b>	<b>Electronic Circuit Lab</b>	<b>Course Code: 210247</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C247.1</b>	Design, build and test single stage CS Amplifier and calculate AC and DC parameters.	3	Apply	
<b>C247.2</b>	Design and implement adjustable voltage regulator.	4	Analyze	
<b>C247.3</b>	Measure the performance parameters of Op-amp and compare with specification given in datasheet.	3	Apply	
<b>C247.4</b>	Design, build and test Op-amp based analog signal processing and conditioning circuits.	3	Apply	

<b>Course:</b>	<b>Digital Circuit Lab</b>	<b>Course Code: 210248</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C248.1</b>	Design, implement, and test combinational logic circuits.	5	Evaluate	
<b>C248.2</b>	Design, implement, and test sequential logic circuits.	5	Evaluate	





<b>Course:</b>	<b>Data Structure and Algorithm Lab</b>	<b>Course Code: 210249</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C249.1</b>	Perform different operation on stack, queue, and string using array, structure and linked list.	3	Apply	
<b>C249.2</b>	Implement different linked list and perform various operation on it.	3	Apply	
<b>C249.3</b>	Solve problems using data structures such as binary trees, binary search trees, and graphs and writing programs for these solutions.	3	Apply	

<b>Course:</b>	<b>Computer Organization Lab</b>	<b>Course Code: 210250</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C250.1</b>	Understand the fundamentals of assembly level programming	2	Understand	
<b>C250.2</b>	Demonstrate the skills in Assembly Language Programming	2	Understand	
<b>C250.3</b>	Apply Concept of assembly language programming to implement data transfer instructions	3	Apply	
<b>C250.4</b>	Implement arithmetic and logical instructions in assembly language	6	Create	

<b>Course:</b>	<b>Electronic Skill Development</b>	<b>Course Code: 210251</b>	<b>2019 Pattern</b>	<b>SEM-I</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C251.1</b>	Apply Electronics Principles in Practice Using Arduino and Python	3	Apply	
<b>C251.2</b>	Understand the principles of hardware design and layout.	2	Understand	



<b>C251.3</b>	Evaluate the suitability of different battery types (Lead Acid, LiPo) for specific applications.	4	Analyze
<b>C251.4</b>	Evaluate the power consumption and budgeting in electronic projects.	4	Analyze
<b>C251.5</b>	Design and implement power-efficient electronic systems.	4	Analyze
<b>C251.6</b>	Apply hardware design principles to create functional electronic circuits.	3	Apply

<b>Course:</b>	<b>Signals and Systems</b>	<b>Course Code: 204191</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03 Hrs/Week</b>	<b>Tutorial Teaching Scheme: 01 Hr/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C291.1</b>	Identify, classify basic signals and perform operations on signals.	2	Understand	
<b>C291.2</b>	Identify, classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.	2	Understand	
<b>C291.3</b>	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.	4	Analyze	
<b>C291.4</b>	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.	3	Apply	
<b>C291.5</b>	Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.	3	Apply	

<b>Course:</b>	<b>Principles of Programming Language</b>	<b>Course Code: 204206</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C206.1</b>	To understand the strengths and weaknesses of programming languages for effective and efficient program Development.	2	Understand	



<b>C206.2</b>	To remember the principles underlying the programming languages enabling to learn new programming Languages.	1	Remember
<b>C206.3</b>	To remember different programming paradigms	1	Remember
<b>C206.4</b>	To understand the programming paradigms effectively in application development.	2	Understand
<b>C206.5</b>	To understand the strengths and weaknesses of programming languages for effective and efficient program Development.	2	Understand
<b>C206.6</b>	To remember the principles underlying the programming languages enabling to learn new programming Languages.	1	Remember

<b>Course:</b>	<b>Principles of Communication System</b>	<b>Course Code: 204193</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C293.1</b>	Analyze time and frequency domain spectra of signal required for modulation schemes under study	4	Analyze	
<b>C293.2</b>	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.	4	Analyze	
<b>C293.3</b>	Describe and analyze the techniques of generation and detection of FM systems and compare with AM systems.	4	Analyze	
<b>C293.4</b>	Demonstrate the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).	3	Apply	
<b>C293.5</b>	Explain the quantization process and digital representation techniques (PCM, DPCM, DM and ADM).	2	Understand	
<b>C293.6</b>	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.	2	Understand	



<b>Course:</b>	<b>Object Oriented Programming</b>	<b>Course Code: 204194</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C294.1</b>	Describe the principles of object oriented programming	1	Remember	
<b>C294.2</b>	Apply the concepts of data encapsulation, inheritance in C++.	3	Apply	
<b>C294.3</b>	Understand Operator overloading and friend functions in C++.	2	Understand	
<b>C294.4</b>	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.	3	Apply	
<b>C294.5</b>	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	Apply	
<b>C294.6</b>	Describe and use of File handling in C++.	2	Understand	

<b>Course:</b>	<b>System Programming &amp; Operating Systems</b>	<b>Course Code: 204207</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Theory Teaching Scheme: 03 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C207.1</b>	Understand the underlying concepts of a database system.	2	Understand	
<b>C207.2</b>	Demonstrate system software concepts, like the use and implementation of assembler, macros, linker, loaders and compiler	2	Demonstrate	
<b>C207.3</b>	Understand Process Management, scheduling in Operating System	2	Understand	
<b>C207.4</b>	Explain the concept of Concurrency and deadlock in Operating System	2	Explain	
<b>C207.5</b>	Demonstrate concept of memory management in Operating System	2	Demonstrate	
<b>C207.6</b>	Describe I/O management, Disk scheduling and file system in Operating System	2	Describe	





<b>Course:</b>	<b>Signals &amp; System Lab</b>	<b>Course Code: 210347</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C247.1</b>	Identify, classify and plot the elementary signal using MATLAB software.	2	Understand	
<b>C247.2</b>	Perform Real time speech signal analysis using MATLAB software.	4	Analyze	
<b>C247.3</b>	Determine the convolution Integral between two signals using MATLAB software.	3	Apply	
<b>C247.4</b>	Find Fourier series coefficients using exponential FS method	3	Apply	
<b>C247.5</b>	Software implementation & Simulation frequency response analysis	3	Apply	

<b>Course:</b>	<b>Communication Lab</b>	<b>Course Code: 210348</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C248.1</b>	Demonstrate the working of amplitude and frequency modulation and analyze its behaviour in terms of modulation index and bandwidth requirement	4	Analyze	
<b>C248.2</b>	Explain sampling, types of sampling and aliasing effect.	2	Explain	
<b>C248.3</b>	Demonstrate generation and detection of digital modulation techniques.	3	Demonstrate	
<b>C248.4</b>	Simulate the communication systems to analyze its performance in presence of noise.	4	Analyze	



<b>Course:</b>	<b>Object Oriented Programming Lab</b>	<b>Course Code: 210349</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C249.1</b>	Apply object-oriented programming principles to sort the numbers, container class and operation on complex number using class in C++.	3	Apply	
<b>C249.2</b>	Apply the concept of inheritance to implement multiple inheritances in C++.	3	Apply	
<b>C249.3</b>	Apply the concept of polymorphism to implement function overriding, function overloading and operator overloading concept in C++.	3	Apply	

<b>Course:</b>	<b>Employability Skill Development</b>	<b>Course Code: 210350</b>	<b>2019 Pattern</b>	<b>SEM-II</b>
<b>Class:</b>	<b>S.E. Electronics and Computer Engineering</b>	<b>Practical Teaching Scheme: 02 Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C250.1</b>	Apply SWOC analysis to set personal and career development goals.	4	Apply	
<b>C250.2</b>	Apply effective communication skills in a group setting.	4	Apply	
<b>C250.3</b>	Demonstrate effective leadership and followership in a team setting.	4	Demonstrate	
<b>C250.4</b>	Participate in mock interviews to practice responses and behavior.	5	Participate	
<b>C250.5</b>	Apply strategies to improve listening and reading comprehension.	4	Apply	
<b>C250.6</b>	Apply effective techniques for creating and delivering presentations.	4	Apply	



Course:	Project Based Learning	Course Code: 210351	2019 Pattern	SEM-II
Class:	S.E. Electronics and Computer Engineering	Practical Teaching Scheme: 04 Hrs/Week		
Course Outcome Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C251.1	Identify the real world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate/set relevant aim and objectives.	2	Understand	
C251.2	Understand the contribute to society through proposed solution by strictly following professional ethics and safety measures.	2	Understand	
C251.3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.	3	Analyze	
C251.4	Analyze the results and arrive at valid conclusion.	3	Analyze	
C251.5	Understand the use of technology in proposed work and demonstrate learning in oral and written form.	2	Understand	
C251.6	Develop ability to work as an individual and as a team member	3	Apply	

HoD

Head

Department of Electronics and  
Computer Engineering,  
Pravara Rural Engineering College,Loni.

Principal  
Pravara Rural Engineering  
College,Loni





## Department of Electronics and Telecommunication Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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

Graduates (4-5 years after graduation) will demonstrate ability to,

- PEO1: Ability to exhibit competency in the areas of Electronics and Telecommunication Engineering like Electronic Circuits and Communication.
- PEO2: Design and implement the Embedded systems to resolve societal and industrial problems using modern engineering hardware and software tools.
- PEO3: Ability to inculcate software proficiency skills for Industry.

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

- PSO1: Engage in Designing, Testing, Operating, Manufacturing Systems in the field of Electronics and Telecommunication Engineering.
- PSO2: Solve Problems of allied areas by applying the knowledge of Electronics and Telecommunication Engineering.
- PSO3: Ability to update knowledge with emerging technologies to embrace professional and ethical attitude in multidisciplinary projects.
- PSO4: Work effectively as individual and as team member to make effective contributions to the benefit of workplace and community.



*Sym*  
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HEAD OF DEPARTMENT  
Dept. of Elec. & Telecomm.  
Engineering  
P R E C, LONI-413736

*Pravara*

Principal  
Pravara Rural Engineering  
College, Loni



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**Department of Electronics and Telecommunication Engineering**

**Course Outcomes (2019 Course)**

**Class: SE Electronics and Telecommunication Engineering**

Course	Electronic Circuits	Course Code: 204181	2019 Pattern	Sem-I
Class	SE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C281.1	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier	2	Understand	
C281.2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.	3	Apply	
C281.3	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies	4	Analyze	
C281.4	Explain internal schematic of Op-Amp and define its performance parameters.	2	Understand	
C281.5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.	3	Apply	
C281.6	Understand and compare the principles of various data conversion techniques and PLL with their applications.	2	Understand	

Course	Digital Circuits	Course Code: 204182	2019 Pattern	Sem-I
Class	SE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C282.1	Discuss Classification and Characteristics of digital Logic Families	2	Comprehend	
C282.2	Describe the basic logic gates and apply various reduction techniques of digital logic circuit.	2	Comprehend	
C282.3	Analyze, design and implement combinational circuits	4	Analyze	
C282.4	Analyze, design and implement sequential logic circuits	4	Analyze	
C282.5	Discuss Classification and Characteristics of digital Logic Families	2	Comprehend	
C282.6	Explain Programmable Logic Devices (PLDs) & Semiconductor Memories	2	Comprehend	

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Course	Electrical Circuits	Course Code: 204183	2019 Pattern	Sem-I
Class	SE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C283.1	Analyze the simple DC and AC circuit with circuit simplification techniques.	4	Analyse	
C283.2	Formulate and analyze driven and source free RL and RC circuits.	4	Analyse	
C283.3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.	4	Analyse	
C283.4	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.	2	Understand	
C283.5	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.	2	Understand	
C283.6	Analyze and select a suitable motor for different applications.	4	Analyse	

Course	Data structures	Course Code: 204184	2019 Pattern	Sem-I
Class	SE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C284.1	Solve mathematical problems using C programming language.	3	Apply	
C284.2	Implement sorting and searching algorithms and calculate their complexity.	2	Understand	
C284.3	Develop applications of stack and queue using array.	3	Apply	
C284.4	Demonstrate applicability of Linked List.	3	Apply	
C284.5	Demonstrate applicability of nonlinear data structure – BinaryTree with respect to its time complexity.	3	Apply	
C284.6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.	3	Apply	

Course	Engineering Mathematics III	Course Code: 207005	Sem-I
Class	SE E&TC	Theory Teaching Scheme:- 4Hrs/Week	
Course Outcome Code	Statements	Blooms Taxonomy	
		Level	Descriptor
C205.1	Solve higher order linear differential equations and its applications to engineering problems	3	Apply
C205.2	Study Fourier and Z- Transform techniques to solve differential equations and their applications.	1	Remember
C205.3	Understand and apply various numerical techniques to solve problems in engineering.	2	Understand
C205.4	Understand the fundamental concept of vector differentiation and its application in Engineering.	2	Understand
C205.5	Understand the fundamental concept vector integral calculus and its application in Engineering.	2	Understand

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C205.6	Understand the function of complex variable and to evaluate complex integration.	2	Understand
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<b>Course</b>	<b>Electronic Circuit Lab</b>	<b>Course Code: 204185</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C285.1</b>	Design, build and test single stage CS Amplifier and calculate AC and DC parameters.	3	Apply	
<b>C285.2</b>	Design and implement adjustable voltage regulator.	4	Analyse	
<b>C285.3</b>	Measure the performance parameters of Op-amp and compare with specification given in datasheet.	3	Apply	
<b>C285.4</b>	Design, build and test Op-amp based analog signal processing and Conditioning circuits.	3	Apply	

<b>Course</b>	<b>Digital circuits Lab</b>	<b>Course Code:-204186</b>	<b>Sem-I</b>
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C286.1</b>	Design and test combinational circuits	5	Synthesize
<b>C286.2</b>	Design and develop sequential circuits.	5	Synthesize
<b>C286.3</b>	Design and validate the counters and registers for synchronous and asynchronous circuits	5	Synthesize

<b>Course</b>	<b>Electrical Circuit Lab</b>	<b>Course Code: 204187</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C287.1</b>	Analysis of simple AC and DC circuit using network simplification circuit	4	Analyse	
<b>C287.2</b>	Study the characteristic of DC shunt motor, 3 phase induction motor.	2	Understand	
<b>C287.3</b>	Study the characteristic of BLDC motor and Stepper motor.	2	Understand	
<b>C287.4</b>	Understand the case study on motors used in electrical vehicles.	2	Understand	

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<b>Course</b>	<b>Data Structures Lab</b>	<b>Course Code:-204188</b>	<b>Sem-I</b>	
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C288.1</b>	Perform String operation using array and data base management using array of structure.	3	Apply	
<b>C288.2</b>	Perform operation on stack and queue using array and array of Structure.	3	Apply	
<b>C288.3</b>	Implement different linked list and perform various operation on It.	3	Apply	
<b>C288.4</b>	Solve problems using data structures such as binary trees, binary Search trees, and graphs and writing programs for these solutions.	3	Apply	

<b>Course</b>	<b>Electronic Skilldevelopment</b>	<b>Course Code:-204189</b>	<b>Sem-I</b>	
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C289.1</b>	Demonstrate and perform the functioning of common electronics components for basic application	3	Apply	
<b>C289.2</b>	Develop PCB layout, perform fault finding using testing and Measuring equipment's.	3	Apply	
<b>C289.3</b>	Assemble and design basic application using basic electronics components.	3	Apply	
<b>C289.4</b>	Understand and use of various types of Batteries, and power budget calculation.	2	Understand	

<b>Course</b>	<b>Signals &amp; Systems</b>	<b>Course Code: 204191</b>	<b>2019 Pattern</b>	<b>Sem-II</b>	
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Theory Teaching Scheme:- 3Hrs/Week</b>			
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>			
		<b>Level</b>	<b>Descriptor</b>		
<b>C291.1</b>	Identify, classify basic signals and perform operations on signals.	2	Understand		
<b>C291.2</b>	Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between two signals.	2	Understand		
<b>C291.3</b>	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.	4	Analyze		
<b>C291.4</b>	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.	4	Analyze		
<b>C291.5</b>	Define and Describe the probability, random variables and random signals. Compute Probability, CDF and PDF.	3	Apply		

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Course	Control Systems	Course Code: 204192	2019 Pattern	Sem-II
Class	SE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C292.1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.	3	Apply	
C292.2	Perform time domain analysis of control systems required for stability analysis.	4	Analyse	
C292.3	Perform frequency domain analysis of control systems required for stability analysis.	4	Analyse	
C292.4	Apply root-locus, Frequency Plots technique to analyze control systems.	3	Apply	
C292.5	Express and solve system equations in state variable form.	3	Apply	
C292.6	Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.	2	Understand	

Course	Principles of Communication Systems	Course Code: 204193	2019 Pattern	Sem-II
Class	SE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C293.1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.	3	Apply	
C293.2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.	4	Analyze	
C293.3	Explain generation and detection of FM systems and compare with AM systems.	4	Analyze	
C293.4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).	3	Apply	
C293.5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).	3	Apply	
C293.6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital Transmission.	3	Apply	

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<b>Course</b>	<b>Object Oriented Programming</b>	<b>Course Code: 204194</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Theory Teaching Scheme:- 3Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C294.1</b>	Describe the principles of object oriented programming	1	Remember	
<b>C294.2</b>	Apply the concepts of data encapsulation, inheritance in C++.	3	Apply	
<b>C294.3</b>	Understand Operator overloading and friend functions in C++.	2	Understand	
<b>C294.4</b>	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.	3	Apply	
<b>C294.5</b>	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.	3	Apply	
<b>C294.6</b>	Describe and use of File handling in C++.	2	Understand	

<b>Course</b>	<b>Signals &amp; Control System Lab</b>	<b>Course Code: 204195</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C295.1</b>	Identify, classify and plot the elementary signal using MATLAB software.	2	Understand	
<b>C295.2</b>	Perform Real time speech signal analysis using MATLAB software.	4	Analyse	
<b>C295.3</b>	Determine the convolution Integral between two signals using MATLAB software.	3	Apply	
<b>C295.4</b>	Find Fourier series coefficients using exponential FS method	1	Remember	
<b>C295.5</b>	Evaluate the various parameters of steady state analysis and transient analysis of a control system	5	Synthesis	
<b>C295.6</b>	Examine the stability criteria for a control system using Bode and Nyquist plot.	4	Analyse	

<b>Course</b>	<b>Principle of Communication Systems Lab</b>	<b>Course Code:- 204196</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class</b>	<b>SE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C296.1</b>	Demonstrate generation and detection of analog modulation techniques.	3	Apply	
<b>C296.2</b>	Demonstrate generation and detection of digital modulation techniques.	3	Apply	
<b>C296.3</b>	Explain sampling, types of sampling and aliasing effect.	3	Apply	
<b>C296.4</b>	Explain PCM, delta modulation, adaptive delta modulation	3	Apply	

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Course	Object Oriented Programming Lab	Course Code:- 204197	2019 Pattern	Sem-II
Class	SE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C297.1	Apply object-oriented programming principles to sort the numbers, container class and operation on complex number using class in C++.		3	Apply
C297.2	Apply the concept of inheritance to implement multiple inheritances in C++.		3	Apply
C297.3	Apply the concept of polymorphism to implement function overriding, function overloading and operator overloading concept in C++.		3	Apply
C297.4	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.		3	Apply

Course	Data Analytics Lab	Course Code: 204198	2019 Pattern	Sem-II
Class	SE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C298.1	Understand the Python Packages for Data Science and accessing Databases with Python.		2	Understand
C298.2	Describe the Data Visualization techniques in Python.		2	Understand
C298.3	Apply the concepts of Data Wrangling and Statistical Data Analysis in python.		3	Apply
C298.4	Apply the knowledge of Exploratory data analysis for descriptive statistics, correlation.		3	Apply

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Course	Employability Skill Development	Course Code:- 204199	2019 Pattern	Sem-II
Class	SE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C299.1	Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.	6	Evaluate	
C299.2	Evaluate the validity and reliability of information shared by group members and assess the effectiveness of one's own performance in a mock interview.	6	Evaluate	
C299.3	Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.	5	Synthesis	
C299.4	Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.	5	Synthesis	

Course	Project Based Learning	Course Code:- 204200	2019 Pattern	Sem-II
Class	SE E&TC	Theory Teaching Scheme:- 2Hrs/Week & Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C200.1	Identify the problem through literature survey and set relevant aim and objectives.	1	Remember	
C200.2	Propose a suitable solution based on the fundamentals of electronics and communication engineering.	4	Analyse	
C200.3	Analyze the results and arrive at valid conclusion.	4	Analyse	
C200.4	Use technology in proposed work and demonstrate learning in oral and written form.	3	Apply	
C200.5	Develop ability to work as an individual and as a team member.	5	Develop	

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Course	Digital Communication	Course Code: 304181	2019 Pattern	Sem-I	
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week			
Course Outcome Code	Statements			Blooms Taxonomy	
				Level	Descriptor
C381.1	Apply the statistical theory for describing various signals in a communication system.			3	Apply
C381.2	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.			4	Analyze
C381.3	Describe and analyze the digital communication system with spread spectrum modulation.			4	Analyze
C381.4	Analyze a communication system using information theoretic approach.			4	Analyze
C381.5	Use source coding techniques to improve performance of a digital communication system.			5	Synthesize
C381.6	Use channel coding techniques to improve performance of a digital communication system.			5	Synthesize

Course	Electromagnetic Field Theory	Course Code:- 304182	2019 Pattern	Sem-I	
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week			
Course Outcome Code	Statements			Blooms Taxonomy	
				Level	Descriptor
C382.1	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.			3	Apply
C382.2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.			3	Apply
C382.3	State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.			3	Apply
C382.4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.			4	Analyze
C382.5	Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart.			3	Apply
C382.6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics.			2	Understand

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Course	Database Management	Course Code:- 304183	2019 Pattern	Sem-I
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C383.1	Understand the underlying concepts of a database system.		2	Understand
C383.2	Design a database schema for a given problem-domain using data model.		5	Synthesis
C383.3	Formulate, using SQL/DML/DDDL commands, solutions to a wide range of query and update problems.		5	Synthesis
C383.4	Implement transactions, concurrency control, and be able to do Database recovery.		3	Apply
C383.5	Understand various Parallel Database Architectures and its applications.		2	Understand
C383.6	Understand various Distributed Database Architectures and its applications.		2	Understand

Course	Microcontrollers	Course Code:- 304184	2019 Pattern	Sem-I
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C384.1	Understand the fundamentals of microcontroller and programming.		2	Understand
C384.2	Interface various electronic components with microcontrollers.		3	Apply
C384.3	Analyze the features of PIC 18F XXXX.		4	Analyse
C384.4	Describe the programming details in peripheral support.		2	Understand
C384.5	Develop interfacing models according to applications.		3	Apply
C384.6	Evaluate the serial communication details and interfaces.		4	Analyse

Course	Fundamentals of JAVA Programming	Course Code:- 304185	2019 Pattern	Sem-I
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C385.1	Understand the basic principles of Java programming language		2	Understand
C385.2	Apply the concepts of classes and objects to write programs in Java		3	Apply
C385.3	Demonstrate the concepts of methods & Inheritance		3	Apply
C385.4	Use the concepts of interfaces & packages for program implementation		3	Apply
C385.5	Understand multithreading and Exception handling in Java to develop robust programs		2	Understand
C385.6	Use Graphics class, AWT packages and manage input and output files in Java		3	Apply

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<b>Course</b>	<b>Digital Communication Lab</b>	<b>Course Code:- 304186</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class</b>	<b>TE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C386.1</b>	Understand and perform experimentation using hardware for digital communication techniques.	3	Apply	
<b>C386.2</b>	Understand and perform experimentation using software for digital communication techniques.	3	Apply	
<b>C386.3</b>	Design and perform experimentation using software for source coding techniques.	5	Synthesize	
<b>C386.4</b>	Design and perform experimentation using software for channel coding techniques.	5	Synthesize	

<b>Course</b>	<b>Database Management Lab</b>	<b>Course Code:- 304187</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class</b>	<b>TE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C387.1</b>	Design and Implement database Schema.	3	Apply	
<b>C387.2</b>	Devise queries using SQL DDL and DML commands.	3	Apply	
<b>C387.3</b>	Develop application programs using PL/SQL	3	Apply	
<b>C387.4</b>	Understand various queries execution such as relational constraints, trigger	2	Understand	

<b>Course</b>	<b>Microcontroller Lab</b>	<b>Course Code:-304188</b>	<b>Sem-I</b>	
<b>Class</b>	<b>TE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C388.1</b>	Apply the programing knowledge to write C language programs for memory transfer using 8051 Microcontroller	3	Apply	
<b>C388.2</b>	Develop C language programs and implement real world interfacing using 8051 Microcontroller.	4	Develop	
<b>C388.3</b>	Develop C language programs for interfacing with external hardwar using PIC 18 Microcontroller.	4	Develop	





Course	Elective I Lab	Course Code:- 304189	2019 Pattern	Sem-I
Class	TE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C389.1	Apply the basic programming concepts of Java to develop simple programs		3	Apply
C389.2	Apply the concepts of classes and objects to write programs in Java		3	Apply
C389.3	Demonstrate the concepts of methods & Inheritance		3	Apply
C389.4	Use the concepts of interface for program implementation in Java		3	Apply
C389.5	Understand Exception handling to develop programs in Java		2	Understand
C389.6	Use the concepts of Graphics class for program implementation in Java		3	Apply

Course	Skill Development	Course Code:- 304190	2019 Pattern	Sem-I
Class	TE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C390.1	Elaborate the Troubleshooting and maintenance of power supply.		2	Understand
C390.2	Design and Simulate dc-dc boost converter, PID controller.		3	Apply
C390.3	Design a webpage with help of HTML tags.		3	Apply
C390.4	Elaborate the Testing of batteries and study of biomedical instrumentation with the help of case study.		2	Understand

Course	Cellular Networks	Course Code:- 304192	2019 Pattern	Sem-II
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C392.1	Understand the fundamentals of wireless communications.		2	Understand
C392.2	Discuss and study OFDM and MIMO concepts.		2	Understand
C392.3	Apply fundamentals of mobile communication for Cellular systems.		3	Apply
C392.4	Analyze aspects of wireless system planning.		4	Analysis
C392.5	Understand the modern and futuristic wireless networks architecture.		2	Understand

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Course	Project Management	Course Code:- 304193	2019 Pattern	Sem-II
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C393.1	Apply the fundamental knowledge of project management for effectively handling the projects.		3	Apply
C393.2	Identify and select the appropriate project based on feasibility study and undertake its effective planning.		1	Identify
C393.3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.		5	Evaluate
C393.4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.		3	Apply
C393.5	Interpret and assess the project risks and manage finances in line with Project Financial Management.		2	Understand
C393.6	Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.		6	Creating

Course	Power Devices & Circuits	Course Code:- 304194	2019 Pattern	Sem-II
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C394.1	Differentiate based on the characteristic parameters among SCR,GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings		2	Understand
C394.2	Design triggering / driver circuits for various power devices.		6	Create
C394.3	Evaluate and analyze various performance parameters of the different converters and its topologies		5	Evaluate
C394.4	Understand significance and design of various protection circuits for power devices.		2	Understand
C394.5	Evaluate the performance of uninterruptible power supplies,switch mode power supplies and battery.		6	Create
C394.6	Understand case studies of power electronics in applications like electric vehicles, solar systems		2	Understand

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Course	Embedded Processor	Course Code:- 304195	2019 Pattern	Sem-II
Class	TE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C395.1	Understand basics of Embedded C Programming and usage of Embedded C and study different software tools for programming microcontrollers.		2	Understand
C395.2	Categorize various Embedded Processor architectures related to industrial application		2	Understand
C395.3	Implement the interfacing of ARM 7 based microcontroller with on chip peripherals and external peripherals		3	Apply
C395.4	Understand the architectures of ARM Cortex M4 Microcontrollers and its advantages over ARM 7 Microcontrollers		2	Understand
C395.5	Implement the real world programming of ARM Cortex M4 based microcontroller with on chip peripherals and external peripherals		3	Apply
C395.6	Recognize the interfacing of real world sensors and standard buses and develop embedded application using different case studies		3	Apply

Course	Cellular Networks Lab	Course Code:- 304196	2019 Pattern	Sem-II
Class	TE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C396.1	Able to develop software program and simulate it for Path loss and BER calculation for wireless communication.		3	Apply
C396.2	Able to develop software program and simulate it for performance parameters of Wireless Channel.		3	Apply
C396.3	Able to develop software program and simulate it for Link budget analysis for wireless communication.		3	Apply
C396.4	Able to develop software program and simulate it for cellular system.		3	Apply

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Course	Power Devices & Circuits Lab	Course Code:- 304197	2019 Pattern	Sem-II
Class	TE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C397.1	Study the characteristics of different semiconductor devices like SCR, GTO, MOSFET & IGBT etc. experimentally		2	Understand
C397.2	Analysis of power converter circuit for R/RL load		4	Analyse
C397.3	study battery testing, safety and maintenance of batteries		2	Understand
C397.4	Performance Evaluation for Case Studies Like SMPS, Controllers.		6	Evaluate

Course	Embedded Processor Lab	Course Code:- 304198	2019 Pattern	Sem-II
Class	TE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C398.1	Implement the real world programming of ARM 7 based microcontroller with on chip peripherals ADC, LCD etc.		3	Apply
C398.2	Implement the real world programming of ARM 7 based microcontroller with off chip peripheral device GPS.		3	Apply
C398.3	Implement the STM32FXX Microcontroller interfacing with On chip ADC and Seven Segment LED.		3	Apply
C398.4	Implement the STM32FXX Microcontroller interfacing with DHT 11, accelerometer cum Gyroscope MPU 6050 and LDR.		3	Apply

Course	Internship	Course Code:- 304199	2019 Pattern	Sem-II
Class	TE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C399.1	Develop professional competence through internship.		5	Synthesis
C399.2	Apply academic knowledge in a personal and professional environment		3	Apply
C399.3	Build the professional network and expose students to future employees		5	Synthesis
C399.4	Apply professional and societal ethics in their day to day life.		3	Apply
C399.5	Become a responsible professional having social, economic and administrative considerations		2	Understand
C399.6	Make own career goals and personal aspirations.		5	Synthesis

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Course	Mini Project	Course Code:- 304200	2019 Pattern	Sem-II
Class	TE E&TC	Practical Teaching Scheme:- 4Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C300.1	Identify the problem statement based on interested domain in recent trends.		1	Remember
C300.2	Apply engineering knowledge for the selection of appropriate software, hardware and development of circuit diagram and software to solve the identified problem.		3	Apply
C300.3	Develop problem-solving skills by identifying and resolving issues encountered during the testing of Mini Project.		5	Synthesis
C300.4	Prepare a technical report based on the Mini project.		3	Apply
C300.5	Develop communication and presentation skills by effectively deliver technical seminar based on the Mini Project work.		5	Synthesis

Course	Radiation & Microwave Theory	Course Code:- 404181	2019 Pattern	Sem-I
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C481.1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.		3	Apply
C481.2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.		2	Understand
C481.3	Explore construction and working of principles passive microwave devices/components.		2	Understand
C481.4	Explore construction and working of principles active microwave devices/components.		2	Understand
C481.5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices.		3	Analyse
C481.6	Know the various microwave systems, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability.		1	Remember

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Course	VLSI Design and Technology	Course Code:- 404182	2019 Pattern	Sem-I
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C482.1	Develop effective HDL codes for digital design.		6	Develop
C482.2	Apply knowledge of real time issues in digital design.		3	Apply
C482.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.		3	Model
C482.4	Design CMOS circuits for specified applications.		6	Design
C482.5	Analyze various issues and constraints in design of an ASIC.		4	Analyse
C482.6	Apply knowledge of testability in design and Build In Self-Test (BIST) circuit.		3	Apply

Course	Cloud Computing	Course Code:- 404183	2019 Pattern	Sem-I
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C483.1	Understand the basic concepts of Cloud Computing.		2	Understand
C483.2	Describe the underlying principles of different Cloud Service Models.		2	Understand
C483.3	Classify the types of Virtualizations		2	Understand
C483.4	Examine the Cloud Architecture and understand the importance of Cloud Security.		4	Analysis
C483.5	Develop applications on Cloud Platforms.		3	Apply
C483.6	Evaluate distributed computing and the Internet of Things.		4	Analysis

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Course	Elective - 3 (E&RTOS)	Course Code:- 404184	2019 Pattern	Sem-I
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C484.1	Apply design metrics of Embedded systems to design real time applications to match recent trends in technology.		3	Apply
C484.2	Apply Real time systems concepts.		3	Apply
C484.3	Evaluate $\mu$ COS operating system and its services.		5	Evaluate
C484.4	Apply Embedded Linux Development Environment and testing tools.		3	Apply
C484.5	Analyse Linux operating system and device drivers.		4	Analyse

Course	Elective - 4 (EPD)	Course Code:- 404185	2019 Pattern	Sem-I
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C485.1	Understand and explain design flow of design of electronics product		2	Understand
C485.2	Associate with various circuit design issues and testing		3	Apply
C485.3	Inferring different software designing aspects and the Importance of product test & test specifications		5	Evaluate
C485.4	Summarizing printed circuit boards and different parameters		2	Understand
C485.5	Estimating assorted product design aspects.		4	Analyse
C485.6	Exemplifying special design considerations and importance of documentation.		2	Understand

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Course	Lab Practice - 1 (RMT & Cloud Computing)	Course Code:- 404186	2019 Pattern	Sem-I
Class	BE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C486.1	Illustrate the fundamental parameters of antennas operating at various frequencies.	3	Apply	
C486.2	Devise set ups of microwave measurement devices to measure performance parameters of microwave components in various applications.	5	Synthesis	
C486.3	Develop applications on Cloud Platforms.	3	Apply	
C486.4	Examine the application of IoT based on cloud and Tools for building a cloud.	4	Analysis	

Course	Lab Practice - 2 (VLSI Design & Elective -3)	Course Code:- 404187	2019 Pattern	Sem-I
Class	BE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C487.1	Write the VHDL Code for various schematics viz. LCD Interface, Counter, Keypad Interface and demonstrate the same.	2	Comprehension	
C487.2	Prepare the CMOS Layout of basic Gates, Universal Gates, Adders and Multiplexers and simulate the same.	2	Comprehension	
C487.3	Understand the concepts of multitasking, priority scheduling, and context switching in RTOS.	2	Understand	
C487.4	Apply the concepts learned in the course to solve real-world problems in embedded systems and IoT.	2	Apply	

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<b>Course</b>	<b>Project Stage - I</b>	<b>Course Code:- 404188</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class</b>	<b>BE E&amp;TC</b>	<b>Practical Teaching Scheme:- 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C488.1</b>	Demonstrate a sound technical knowledge in field of E&TC in the form of project.	2	Demonstrate	
<b>C488.2</b>	Undertake real life problem identification, formulation and solution.	3	Apply	
<b>C488.3</b>	Design engineering solutions to complex problems utilizing a systematic approach.	6	Design	
<b>C488.4</b>	Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.	2	Demonstrate	

<b>Course</b>	<b>Fiber Optic Communication</b>	<b>Course Code:- 404190</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class</b>	<b>BE E&amp;TC</b>	<b>Theory Teaching Scheme:- 3Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Blooms Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C490.1</b>	Explain the basic working mechanism and components of optical fiber communication system.	2	Understand	
<b>C490.2</b>	Compare and contrast different types of optical sources based on their performance parameters.	4	Analyse	
<b>C490.3</b>	Compare and contrast different types of optical detectors based on their performance parameters.	4	Analyse	
<b>C490.4</b>	Evaluate the performance viability of optical links using the power and rise time budget analysis and explain the working principles of WDM systems.	4	Analyse	
<b>C490.5</b>	Explain the working principles and architectures of optical networks.	2	Understand	
<b>C490.6</b>	Explain the significance of measuring numerical aperture, attenuation, macro bending loss, fiber dispersion and measurement equipment's in fiber optic systems.	2	Understand	

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Course	Elective - 5 Embedded System Design	Course Code:- 404191	2019 Pattern	Sem-II
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C491.1	Apply the design aspects of embedded system for real world application.		3	Apply
C491.2	Create and debug a firmware for the Embedded System using ARM Cortex M4.		6	Create
C491.3	Develop a specific software code for the functionality of the Embedded System.		3	Apply
C491.4	Utilize an open source RTOS for embedded system design.		3	Apply
C491.5	Create an advanced embedded system using STM32F4 Microcontroller.		6	Create
C491.6	Explore Embedded Android system with libraries.		2	Understand

Course	Elective - 6	Course Code:- 404192	2019 Pattern	Sem-II
Class	BE E&TC	Theory Teaching Scheme:- 3Hrs/Week		
Course Outcome Code	Statements		Blooms Taxonomy	
			Level	Descriptor
C492.1	Design websites using free tools like Word press and explore it for digital marketing.		3	Design
C492.2	Apply various keywords for a website & to perform SEO.		3	Apply
C492.3	Understand the various SEM Tools and implement the Digital Marketing Tools.		2	Understand
C492.4	Illustrate the use of Facebook, Instagram and YouTube for Digital Marketing in real life.		3	illustrate
C492.5	Use Linked in platform for various campaigning.		2	Use
C492.6	Understand the importance of recent trends in digital marketing.		2	Understand

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Course	Innovation & Entrepreneurship	Course Code:- 404193	2019 Pattern	Sem-II
Class	BE E&TC	Tutorial Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statement s	Blooms Taxonomy		
		Level	Descriptor	
C493.1	Understand Innovation, Entrepreneurship and characteristics of an entrepreneur	2	Comprehen	
C493.2	Develop a strong understanding of the Design Process and its application in variety of business settings.	5	Synthesize	
C493.3	Generate sustainable ideas	5	Synthesize	
C493.4	Explore various processes required to be an entrepreneur.	3	Apply	
C493.5	Understand patents and its process of filing.	2	Comprehen	
C493.6	Choose and use appropriate social media for marketing.	3	Apply	

Course	Digital Business Management	Course Code:- 404194	2019 Pattern	Sem-II
Class	BE E&TC	Tutorial Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C494.1	Identify the Drivers of Digital Business	1	Identify	
C494.2	Illustrate various approaches and techniques for E-Business and Management.	3	Illustrate	
C494.3	Prepare E-Business Plan.	6	Compose	

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Course	Fiber Optic Lab	Course Code:- 404195	2019 Pattern	Sem-II
Class	BE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C495.1	Estimate the Numerical Aperture and measure the attenuation characteristics of a given optical fiber using appropriate experimental setups.	2	Understand	
C495.2	Evaluate the performance of the optical source, photo detector Setup and fiber optic link.	4	Analysis	
C495.3	Utilize the simulation software to simulate a WDM system and optical power budget and rise time budget analysis of optical fiber systems.	3	Apply	
C495.4	Compile technical information related to state of art components, Standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.	4	Analysis	

Course	Lab Practice - 3 (Elective - 5) ESD Lab	Course Code:- 404196	2019 Pattern	Sem-II
Class	BE E&TC	Practical Teaching Scheme:- 2Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C496.1	Evaluate the functionality of the LED, LCD and push button switch in the context of STM32F4.	5	Evaluate	
C496.2	Explain the significance of using interrupts in UART communication and the role of CubeMX in FreeRTOS Configuration.	2	Understand	
C496.3	Create a program to write Timer and ADC drivers using HAL Functions.	6	Create	
C496.4	Create a detailed report on the STM32F4 board with its components, functionalities, and usage.	6	Create	

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Course	Project Stage - II	Course Code:- 404197	2019 Pattern	Sem-II
Class	BE E&TC	Practical Teaching Scheme:- 10 Hrs/Week		
Course Outcome Code	Statements	Blooms Taxonomy		
		Level	Descriptor	
C497.1	To develop comprehensive solution to the problem identified and meet the requirements as stated in project part 1.	3	Apply	
C497.2	Design and develop the solution for identified problem using hardware and software tools with cost effectiveness and Maintaining ethical values.	3	Apply	
C497.3	Achieve the desired results within stipulated time and do critical analysis of results and their interpretation.	5	Evaluate	
C497.4	To impart skills in preparing detailed report describing the project and results.	3	Apply	
C497.5	Communicate technical and general information by means of oral as well as written presentation skills with professionalism.	2	Demonstratee	



  
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## Department of Instrumentation and Control Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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## 11. Project management and

**finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**12. Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

## Program Educational Objectives (PEOs)

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** Actively participate in designing, calibration and testing, operating and maintaining systems in the field of Instrumentation & Control engineering and allied industry.

**PEO2:** Solve problems in the field of commercial, residential and industrial automation by applying knowledge of Instrumentation & Control Engineering.

**PEO3:** Work as an individual and as a team member/leader in multidisciplinary projects effectively and ethically.

**PEO4:** Provide innovative, feasible, economical and socially relevant solutions to engineering problems, based on analysis, design and development using software and hardware platforms.

## Program Specific Outcomes (PSOs)

**PSO1:** Analyze dynamics of process control systems, select sensors/transducers and controllers to ensure the performance, safety and quality of the processes through measuring, monitoring and designing of automated systems.

**PSO2:** Develop mathematical model, validation of model, design and tuning of the controller for process control systems and its realization using DCS, PLC, SCADA and MATLAB.

(Dr.C.B.Kadu)

Head of Department  
Dept. of Instrumentation and  
Control Engineering  
Pravara Rural Engineering College, Loni

Principal  
Pravara Rural Engineering  
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## Department of Instrumentation and Control Engineering

### Course Outcomes (2019 Course)

<b>Course:</b>	<b>Sensors &amp; Transducers</b>	<b>Course Code:206261</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C261.1	Classify units, standards, performance characteristics and estimate static and dynamic characteristics of measurement system.	2	Estimate
C261.2	Analyze the characteristics and applications of displacement, velocity, speed, vibration, acceleration, force, torque, pressure and temperature transducers.	4	Analyze
C261.3	Select suitable sensors/transducers for physical parameter measurement.	3	Select
C261.4	Use dead weight and vacuum gauge tester to calibrate pressure gauges using	3	Apply
C261.5	Examine characteristics of T/C, RTD and LVDT. Design & implement signal conditioning circuits for Thermocouple and RTD for given specification.	4	Design

<b>Course:</b>	<b>Engineering Mathematics- III</b>	<b>Course Code:207008</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical /Tutorial Teaching Scheme: 1Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C208.1	Solve higher order linear differential equations and its applications to engineering problems.	4	Analyze
C208.2	Solve differential equations and their applications using Laplace - Transform techniques.	4	Analyze
C208.3	Evaluate Fourier and Z- Transform techniques to solve differential equations and their applications.	4	Analyze

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C208.4	Apply different types of Statistical methods & Probability distribution in engineering problems.	3	Apply
C208.5	Apply the fundamental concept of vector differentiation & vector integral calculus in Engineering.	3	Apply
C208.6	Evaluate complex integration using complex variables.	4	Analyze

Course:	Linear Integrated Circuits	CourseCode:206262	2019Pattern	Sem-I
Class:	S.E. Instru & Control Engineering	Theory Teaching Scheme: 3Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C262.1	Exemplify block diagram, construction, basic characteristics, open loop & close loop operations of an Operational Amplifier.	3	Apply
C262.2	Analyze and design linear and non-linear applications of an Operational Amplifier.	3	Analyze
C262.3	Analyze Timers and Special purpose ICs such as Voltage controlled Oscillator (LM 566), Phase locked Loop(LM 565), V to F and F to V converter(LM331), Analog Multiplexer/De-multiplexer (CD 4051) , Fixed volt regulators (IC78xx, 79xx), Linear voltage regulator IC 723.	3	Analyze
C262.4	Design applications of timer, high voltage and low voltage Regulators using linear voltage regulator IC 723.	4	Design
C262.5	Compare between Active and Passive filters and Design Low Pass, High Pass and Band Pass Filters.	4	Design

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<b>Course:</b>	<b>Electrical Measurements and Instrumentation</b>	<b>Course Code:206263</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C263.1	Exemplify the fundamentals of measurements and Instrumentation system	3	Estimate
C263.2	Design multirange ammeter and voltmeter for given ranges.	4	Design
C263.3	Determine voltage, frequency and phase shift of unknown signals using Cathode ray oscilloscope.	3	Determine
C263.4	Compute the values of inductance, capacitance using A.C bridge and resistance using D.C bridges.	3	Compute
C263.5	Implement ADC and DAC using special purpose IC and recall the working of different types of recorders.	4	Implement

<b>Course:</b>	<b>Control System Components</b>	<b>Course Code:206264</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C264.1	Select switches, relays & contactors for industrial control applications.	3	Apply
C264.2	Analyze circuits to start, stop, emergency shutdown, protection, braking for three phase motors.	4	Analyze
C264.3	Analyze direction control, speed control, reciprocating, sequencing, meter in and meter out circuits using standard symbols for pneumatic and hydraulic systems.	4	Analyze
C264.4	Demonstrate the use of power control elements, electrical fuse & circuit breakers, Synchros (Transmitter and Receiver), Alarm annunciator.	3	Apply
C264.5	Analyze the importance of safety in industrial control systems.	4	Analyze

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<b>Course:</b>	<b>Computational Techniques</b>	<b>Course Code:206265</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C265.1	Practice with MATLAB environment.	3	Apply
C265.2	Develop MATLAB program to solve Mathematical and Logical operations.	4	Develop
C265.3	Import and Export data using MATLAB.	3	Apply
C265.4	Develop Simulink model of system.	4	Develop

<b>Course:</b>	<b>Communication Skills</b>	<b>Course Code:206266</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C266.1	Identify the strength, weakness, opportunities and threats on given topic.	3	Apply
C266.2	Develop the ability of listening, team activity and communication in public speaking.	3	Apply
C266.3	Develop the ability of letter, application, report, resume and emails writing.	3	Apply
C266.4	Analyze the principles of stress management.	4	Analyze
C266.5	Prepare the goals for personal & career development.	3	Apply

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<b>Course:</b>	<b>Control Systems</b>	<b>Course Code:206268</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C268.1	Classify the control systems.	3	Apply
C268.2	Develop mathematical models of LTI (Linear Time Invariant) systems.	4	Develop
C268.3	Represent the system in canonical forms (signal flow graph)	3	Apply
C268.4	Analyse the LTI system in time domain and frequency domain.	4	Analyze
C268.5	Test the stability of LTI system using conventional methods.	3	Apply

<b>Course:</b>	<b>Digital Electronics</b>	<b>Course Code:206269</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C269.1	Convert one number system to another number system for application in digital system.	3	Apply
C269.2	Analyze the logic circuit minimization using K map and Quine Mccluskey Method and develop the logic circuit.	4	Analyze
C269.3	Design combinational logic circuit using decoder, Encoder, Multiplexer, Demultiplexer.	4	Design
C269.4	Design Synchronous, Asynchronous, sequential, Non sequential counter and convert one type of flip flop to another type of flip flop	4	Design
C269.5	Design divide by N counter using IC such as 7490,7492,7493 and 74193 & Compare characteristics of different logic family.	4	Design

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Course:	Process Loop Elements	Course Code:206270	2019Pattern	Sem-II
Class:	S.E. Instru & Control Engineering	Theory Teaching Scheme: 3Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	
Course Outcome Code	Statements		Bloom's Taxonomy	
			Level	Descriptor
C270.1	Identify process variables, input variables (manipulated and disturbance), output variables, frame the control objectives and draw the control loops for given process.		3	Apply
C270.2	Specify the need of standard signals and Use DPT for level and flow measurement and.		3	Apply
C270.3	Analyze the discontinuous and continuous ( P, I, D, PI, PD and PID) control actions and verify it for standard input signals		4	Analyze
C270.4	Estimate the PID controller parameters by using process reaction curve, Ziegler-Nichols and frequency response method for a given process.		4	Analyze
C270.5	Analyze characteristics of control valve, select and design control valve sizing for gas, vapor and liquid services.		4	Design
C270.6	Identify and analyze different control valve accessories and estimate parameters of a spring and diaphragm actuator for control valve.		4	Analyze

Course:	Signals & Systems	Course Code:206271	2019 Pattern	Sem-II
Class:	S.E. Instru & Control Engineering	Theory Teaching Scheme: 3Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	
Course Outcome Code	Statements		Bloom's Taxonomy	
			Level	Descriptor
C271.1	Identify, represent the type of signals and systems and perform elementary operations on signals.		3	Apply
C271.2	Exemplify fundamental properties of LTI systems and be able to determine response of the system for given input.		3	Apply
C271.3	Determine Fourier series and Fourier transform of Continuous time signals and understand how to interpret and plot Fourier transform magnitude and phase functions.		4	Analyze
C271.4	Analyze and design of an LTI systems using Laplace transform.		4	Analyze
C271.5	Estimate various statistical properties of the signal.		4	Design

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<b>Course:</b>	<b>Data Structure</b>	<b>Course Code:206272</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C272.1	Examine the fundamentals of python and its programming.	3	Apply
C272.2	Apply the concept of variables, expressions, statements to implement functions, conditional statements in python programming.	3	Apply
C272.3	Classify arrays, matrix, list and perform its operations using python programming.	4	Analyze
C272.4	Examine & implement sets, maps and link structure using lists.	4	Analyze
C272.5	Analyze the concept of list, arrays and link list for the implementation of stacks and queues.	4	Analyze

<b>Course:</b>	<b>Project Based Learning</b>	<b>Course Code:206273</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>S.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C273.1	Identify projects relevant to Instrumentation and Control systems.	3	Apply
C273.2	Use different electronic components and sensors/transducers to provide practical solution to real life problems.	3	Apply
C273.3	Design/model/simulate/and fabricate a prototype	4	Analyze
C273.4	Develop mini project which includes measurement of parameter signal processing, controlling, debugging related to objectives defined in the problem statement.	5	Develop
C273.5	Prepare the project report.	3	Apply

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### TE Instrumentation & Control Engineering

<b>Course:</b>	<b>Embedded Systems</b>	<b>Course Code:306261</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C361.1	Analyze architectural details of 8051 microcontroller, memory organization, addressing modes, Instruction set with programming model, software development cycle and assembler directives.	3	Analyze
C361.2	Design and develop interfacing of input and output devices with 8051 microcontroller using assembly level and C programs.	4	Design
C361.3	Design and develop an embedded system for Temperature On/Off Control, Line Tracing Robot and Washing Machine Control based on 8051 microcontroller using assembly level and C programs.	4	Design
C361.4	Analyze basic architecture, characteristics, quality attributes and operating systems of embedded systems.	3	Analyze

<b>Course:</b>	<b>Industrial Automation I</b>	<b>Course Code:306262</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C362.1	Examine the fundamentals of Industrial Automation, PLC & SCADA.	3	Apply
C362.2	Develop Ladder Program using basic & advanced PLC instructions for Sequential & Continuous processes.	4	Develop
C362.3	Interface Analog & Digital I/O devices, Hydraulic and Pneumatic systems and VFD with PLC.	4	Analyze
C362.4	Develop programming using Analog functions for Sequential & Continuous processes.	4	Develop
C362.5	Develop SCADA system for given applications.	4	Develop

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<b>Course:</b>	<b>Modern Control Theory</b>	<b>Course Code:306263</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C363.1	Analyze dynamics of a linear system by state space representation.	3	Apply
C363.2	Design the feedback controller using pole-placement technique.	4	Design
C363.3	Design the state observers.	4	Design
C363.4	Determine the stability of LTI systems.	3	Determine
C363.5	Realize the structure of a discrete time system and model its action mathematically.	3	Apply

<b>Course:</b>	<b>Operating System</b>	<b>Course Code:306264</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C364.1	Exemplify fundamental concepts of operating systems like functions, security, system calls and background of operating system.	2	Understand
C364.2	Illustrate concepts of process management and scheduling algorithm.	4	Analyze
C364.3	Use memory management concept to allocate memory to the process.	3	Apply
C364.4	Analyze the states of deadlock prevention and avoidance in the operating system.	4	Analyze
C364.5	Summarize concept of directory structure, file system and analyze safety measures for operating system.	4	Analyze

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<b>Course: Elective I-A</b>	<b>Mechatronics &amp; Robotics</b>	<b>Course Code:306265-A</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Instru&amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C365A.1</b>	Apply fundamentals of electrical, mechanical and information system for development of mechatronics applications.	3	Apply
<b>C365A.2</b>	Analyze the fundamentals of MEMS, microsystems and Fabrication Technique.	4	Analyze
<b>C365A.3</b>	Analyze the components and scope of robotics in industrial applications.	4	Analyze
<b>C365A.4</b>	Design of robotic arm using kinematics.	4	Design
<b>C365A.5</b>	Develop algorithms and programs for remote robotic applications.	3	Develop

<b>Course: Elective I-B</b>	<b>Data Science</b>	<b>Course Code:306265-B</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T.E. Instru&amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C365B.1</b>	Identify and use different data science processes.	3	Apply
<b>C365B.2</b>	Analysis of statistical data using Descriptive & Inferential statistics.	4	Analyze
<b>C365B.3</b>	Identify and select data science packages.	3	Apply
<b>C365B.4</b>	Analyze the data using Exploratory data analysis methods.	4	Analyze
<b>C365B.5</b>	Represent the data using data cleaning methods and visualize it using Tableau dashboard.	3	Apply

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Course:	Seminar	Course Code:306266	2019Pattern	Sem-I
Class:	T.E. Instru & Control Engineering			

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C366.1	Select the seminar topic on recent technology in the field of instrumentation & Control Engineering.	3	Apply
C366.2	Analysis of topic through survey of related research papers.	4	Analyze
C366.3	Prepare the presentation and communicate effectively.	3	Apply
C366.4	Communicate effectively through well written report.	3	Apply

Course:	Internet of Things	CourseCode:306268	2019Pattern	Sem-II
Class:	T.E. Instru & Control Engineering	Theory Teaching Scheme: 3Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C368.1	Analyze the industry revolutions and the architecture of IoT.	4	Analyze
C368.2	Analyze the OSI model and IoT protocol architecture.	4	Analyze
C368.3	Apply Arduino and Raspberry Pi platform to interface sensors and actuators for development of remote IoT applications.	3	Apply
C368.4	Analyze the cloud computing architecture for development of cloud models and identity management models.	4	Analyze
C368.5	Develop smart IoT applications with IoT security requirements.	3	Develop

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<b>Course:</b>	<b>Industrial Automation II</b>	<b>CourseCode:306269</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C369.1	Examine the fundamentals of DCS system in Industrial Automation.	3	Apply
C369.2	Examine the software and hardware configuration of DCS system.	3	Apply
C369.3	Analyze the different security design approaches, engineering and operator interface issues for designing of DCS system.	4	Analyze
C369.4	Examine the latest networking technologies RS232, RS485, OPC, HART and Field bus protocol.	3	Apply
C369.5	Develop DCS programming for simple process applications.	4	Develop

<b>Course:</b>	<b>Digital Signal Processing</b>	<b>Course Code:306270</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Instru&amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C370.1	Classify the continuous and discrete signals and systems.	3	Apply
C370.2	Analyze the discrete time systems by solving the difference equation, structure realization and convolution.	3	Analyze
C370.3	Analyze the discrete time signals and systems in frequency domain using Fourier Transform & FFT.	3	Analyze
C370.4	Given the frequency domain parameters stop band, pass band attenuation and frequencies able to design digital frequency selective IIR filters using standard approximation.	4	Design
C370.5	Given the filter order and cut-off frequencies able to design frequency selective FIR filter.	4	Design

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<b>Course: Elective II-A</b>	<b>Building Automation</b>	<b>Course Code:306271-A</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C371A.1</b>	Organize Building Automation System (BAS) and identify communication protocols for safety and security of intelligent building.		3	Apply
<b>C371A.2</b>	Analyze the essential parameters for human comfort.		4	Analyze
<b>C371A.3</b>	Analyze the components of Air Handling Unit (AHU) and Variable Air Volume (VAV) system essential for Heating Ventilation and Air Conditioning (HVAC) system.		4	Analyze
<b>C371A.4</b>	Simplify the refrigeration cycle for chilled water and dynamics of boiler for hot water in HVAC system.		4	Analyze
<b>C371A.5</b>	Classify Fire Alarm Systems, Cables and its application for the safety of building.		3	Apply
<b>C371A.6</b>	Develop access control system for intelligent building.		4	Develop

<b>Course: Elective II-B</b>	<b>Machine Learning</b>	<b>Course Code:306271-B</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C371B.1</b>	Exemplify machine learning and its life cycle.		3	Apply
<b>C371B.2</b>	Apply regression analysis for machine learning.		3	Apply
<b>C371B.3</b>	Analysis of statistical data using probability analysis.		4	Analyze
<b>C371B.4</b>	Apply support vector machine for data analysis.		3	Apply
<b>C371B.5</b>	Apply extended methods of supervised machine learning.		3	Apply
<b>C371B.6</b>	Analyze clustering methods of unsupervised machine learning.		4	Analyze

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<b>Course:</b>	<b>Mini Projects</b>	<b>Course Code:306272</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course Outcome Code</b>		<b>Statements</b>	<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C373.1</b>		Identify the Project topic related to subject.	4	Analyze
<b>C373.2</b>		Review of literature survey to formulate problem statement.	3	Apply
<b>C373.3</b>		Design appropriate solution to ensure performance, safety and the quality.	3	Design
<b>C373.4</b>		Develop prototype system using modern tools.	5	Develop
<b>C373.5</b>		Prepare a project report and presentation.	3	Apply

### BE Instrumentation & Control Engineering

<b>Course:</b>	<b>Process Control Techniques</b>	<b>Course Code:406261</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcome Code</b>		<b>Statements</b>	<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C461.1</b>		Identify the input variables, output variables, constraints and characteristics of processes and define control objectives.	3	Apply
<b>C461.2</b>		Derive, develop and analysis of a mathematical model using fundamental laws and by performing experiments on prototype systems.	4	Analyze
<b>C461.3</b>		Design a PID controller using direct synthesis and IMC strategy for stable processes (either minimum or non-minimum phase). Tuning of PID controller using open loop process reaction curve method and closed loop ultimate cycle method.	4	Design
<b>C461.4</b>		Design Cascade, Ratio, Feed forward, Selective, Split range and Inferential Control. Analyze physical realization limitations due to time delays and RHP zeros.	4	Design
<b>C461.5</b>		Determine the degree of interaction and proper input-output pairings that best suited for the control problem through the concept of relative gain array (RGA), and Analyze the dynamics of de-coupler controller.	4	Analyze

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<b>Course:</b>	<b>Project Engineering &amp; Management</b>	<b>Course Code:406262</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C462.1	Exemplify the role and responsibilities of project team in an organization.	3	Apply
C462.2	Develop PERT/CPM network for Project Planning and management.	4	Apply
C462.3	Analyze and prioritize the project risk and prepare project procurement plan	4	Analyze
C462.4	Develop PFD, P&ID, Instrument layout, Junction box layout and Control room layouts in a project	4	Apply
C462.5	Evaluate project performance through the FAT, SAT &CAT.	4	Analyze

<b>Course:</b>	<b>Wireless Sensor Networks</b>	<b>Course Code:406263</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C463.1	Analyze wireless sensor network with respect to wireless sensor, wireless sensor network, and wireless communication.	4	Analyze
C463.2	Suggest an application of wireless sensor network for structural health monitoring, traffic control, precision agriculture and health care.	3	Apply
C463.3	Develop an interfacing circuit for operation of wireless sensors.	3	Apply
C463.4	Analyze the performance of MAC, transport control protocols and middleware protocol for wireless sensor network.	4	Analyze
C463.5	Review the security and safety measures of sensor network.	3	Analyze

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<b>Course:</b> Elective IV-A	<b>Cloud Computing</b>	<b>Course Code:406264</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C464.1	Examine the fundamentals of cloud computing.	3	Apply
C464.2	Apply the cloud file systems for security techniques.	3	Apply
C464.3	Examine the virtualization technologies.	3	Apply
C464.4	Develop amazon EC2, virtual amazon cloud, EBS block store volume, and elastic load balancer for the development of application.	4	Analyze
C464.5	Apply the ubiquitous clouds and Internet of Things to smart buildings and smart power grid, retailing and supply-chain management, cyber-physical system.	3	Apply
C464.6	Analyze the future trends in cloud computing.	4	Analyze

<b>Course:</b>	<b>Virtual Instrumentation Lab</b>	<b>Course Code:406265</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C465.1	Demonstrate the Virtual Instrument concepts through software.	3	Apply
C465.2	Develop program for specific application using Virtual Instrument software.	4	Develop
C465.3	Acquire, analyze and display the throughput of any compatible system.	4	Analyze
C465.4	Develop Interface hardware and software using Virtual Instrument.	4	Develop

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<b>Course:</b>	<b>Project Stage I</b>	<b>Course Code:406266</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C466.1</b>	Identify the project topic in the field of instrumentation and Control Engineering.		3	Apply
<b>C466.2</b>	Survey of literature and Identification of Problem of Project.		4	Analyze
<b>C466.3</b>	Formulate the problem statement and design solution for project.		5	Evaluate
<b>C466.4</b>	Present their work in written and oral forms with ethical values.		3	Apply

<b>Course:</b>	<b>Process Instrumentation</b>	<b>Course Code:406268</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
<b>C468.1</b>	Identify the control objectives, input variables, output variables, control variables, appropriate manipulated variables and disturbance variables for above processes.		3	Apply
<b>C468.2</b>	Analyze the dynamics of Heat Exchanger, Dryer, Evaporator, Boiler, Distillation Column, Reactors, Pumps and Compressors and Determine the scaling equations for above processes.		4	Analyze
<b>C468.3</b>	Design an appropriate regulatory and servo controller (Feedback, Cascade and Feedforward) for Heat Exchanger, Dryer, Evaporator, Distillation column and Reactor to achieve desired performance.		4	Design
<b>C468.4</b>	Design an appropriate regulatory and servo controller (Feedback, Cascade, Selective Split range, Anti-surge) for Boiler, Pumps and Compressors to achieve desired performance.		4	Design
<b>C468.5</b>	Evaluate the tuning, implementation and simulation of appropriate servo and regulatory controller for a given process using MATLAB Simulink and Estimate the performance measures. (Rise time, Settling time, Overshoot, Integral errors).		5	Evaluate

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<b>Course:</b>	<b>Advanced Embedded System</b>	<b>Course Code:406269</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C469.1	Exemplify architectural details of ARM microcontroller, ARM Cortex M3, and ARM LPC2148 microcontroller.	3	Apply
C469.2	Exemplify general purpose and special function registers, interrupts, instruction set with programming and thumb instruction set.	3	Apply
C469.3	Analyze serial communication, bus technology, of ARM LPC2148 microcontroller.	4	Analyze
C469.4	Analyze ARM and THUMB differences, general structure of ARM assembly module and assembler directives.	4	Analyze
C469.5	Design and develop real time ARM embedded system with LPC2148 for home automation system.	4	Design

<b>Course: Elective V-B</b>	<b>Safety Instrumentation Systems</b>	<b>Course Code:406270-B</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C470 B.1	Examine the basic concepts of safety instrumented system.	3	Apply
C470 B.2	Analyze the basic process control system and safety instrumented system.	4	Analyze
C470 B.3	Analyze the components of prevention and mitigation layers in process control systems.	3	Apply
C470 B.4	Determine the safety integrity levels to provide safety instrumented system.	3	Apply
C470 B.5	Identify the failures and analyze the consequences to develop safety instrumented system.	4	Implement

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<b>Course: Elective V-C</b>	<b>Renewable Energy Systems</b>	<b>Course Code:406270-C</b>	<b>2019Pattern</b>	<b>Sem- II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C470C.1</b>	Examine the concept of renewable energy sources, operation and comparative analysis of different concentrating solar power systems.	4	Analyze
<b>C470C.2</b>	Analyze the complexities of energy systems and power grids, and the requirements and industrial impacts of integration, automation and optimization.	4	Analyze
<b>C470C.3</b>	Calculate the major parameters of sun movement, solar radiation, tracking systems and air parameters at different conditions.	3	Apply
<b>C470C.4</b>	Analyze the types of algorithms and understanding and familiarity with engineering and financial aspects of projects.	4	Analyze
<b>C470C.5</b>	Examine the given applications of solar energy.	4	Analyze
<b>C470C.6</b>	Analyze wind energy conversion technologies and hybrid wind energy systems.	4	Analyze

<b>Course: Elective VI-B</b>	<b>Automation In Agriculture</b>	<b>Course Code:406271-B</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C471B.1</b>	Use suitable sensors used for the measurement of soil properties in Agriculture field.	3	Apply
<b>C471B.2</b>	Select Earth Moving equipment's and pumps for agriculture application.	3	Select
<b>C471B.3</b>	Analyze Dynamics of Continuous and Batch Process and Automation Schemes for Green House..	4	Analyze
<b>C471B.4</b>	Analyze the instrumentation & control required for Sugar Industry, distillery plant, Milk processing and dairy.	4	Analyze
<b>C471B.5</b>	Analyze application of PLC & SCADA in Food Packaging Industry.	4	Analyze

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<b>Course:</b> Elective VI-C	<b>Environmental Instrumentation</b>	<b>Course Code:406271-C</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C471C.1</b>	Analyze characteristics of sensors and analytical analyzers used to monitor environmental parameters.	4	Analyze	
<b>C471C.2</b>	Examine quality of air, water and requirements for waste water treatment.	3	Apply	
<b>C471C.3</b>	Analyze ground water and processes for waste water treatment.	4	Analyze	
<b>C471C.4</b>	Examine air sampling methods, air, and sound pollution and monitoring.	4	Analyze	
<b>C471C.5</b>	Analyze global environmental conditions, virtual instruments and rover environmental monitoring station.	4	Analyze	

<b>Course:</b>	<b>Project Stage II</b>	<b>Course Code:406272</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E. Instru &amp; Control Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C472.1</b>	Identify the problem that deals with society, industry or research needs based on investigated literature survey to explore recent technical trends.	3	Apply	
<b>C472.2</b>	Analyze identified problem and suggest appropriate solution to solve the problem.	4	Analyze	
<b>C472.3</b>	Design an appropriate solution to ensure performance, safety and quality.	5	Evaluate	
<b>C472.4</b>	Implementation of solution using modern tools and development of prototype systems.	6	Create	
<b>C472.5</b>	Work as an individual and contribute as a team member with effective management skills to achieve a desired objective.	3	Apply	
<b>C472.6</b>	Present their work in written and oral form with ethical values.	3	Apply	

(Dr.C.B.Kadu)

**Head of Department**  
Dept. of Instrumentation and  
Control Engineering  
Pravara Rural Engineering College, Loni

**Principal**  
Pravara Rural Engineering  
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## Department of Mechanical Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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

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

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** To apply knowledge of mechanical engineering to solve real-time engineering problems.

**PEO2:** To design and develop mechanical, interdisciplinary, and innovative systems.

**PEO3:** To work with effective communication skills, leadership, ethics, and lead to a successful career in industry, research, entrepreneurship, and higher studies

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

**PSO1:** Design, analyze and manufacture mechanical engineering systems.

**PSO2:** To conceive knowledge, hands on practices in areas: Tribology, Heat power, Design engineering, Materials and Mechanical Engineering Software's.

**PSO3:** To conceive knowledge and hands on practices in multidisciplinary areas: Robotics, Mechatronics and Machine learning.

  
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Head of Department  
Department of Mechanical Engineering  
P.R.E.C. LONI-413736

  
Principal  
Pravara Rural Engineering  
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Department of Mechanical Engineering  
Course Outcomes (2019 Course)  
S.E.Mechanical Engineering

Course:	Solid Mechanics	Course Code: 202041	2019 Pattern	Sem-I
Class:	SE Mechanical Engineering	Theory Teaching Scheme: 4Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C241.1	Define various types of stresses and strain developed on determinate and indeterminate members.	1	Define
C241.2	Draw shear force and bending moment diagram for various types of transverse loading and support.	2	Draw
C241.3	Compute the slope & deflection, bending stresses and shear stresses on a beam.	3	Compute
C241.4	Calculate torsional shear stress in shaft and buckling on the column.	4	Calculate
C241.5	Apply the concept of principal stresses and theories of failure to determine stresses on a 2-d element.	3	Apply
C241.6	Utilize the concepts of sfd & bmd, torsion and principal stresses to solve combined loading application based problems.	3	Utilize

Course:	Solid Modelling and Drafting	Course Code: 202042	2019 Pattern	Sem-I
Class:	SE Mechanical Engineering	Theory Teaching Scheme: 3Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	
Course Outcome Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C242.1	Utilize knowledge of curves and surfacing features and methods to create complex solid geometry.	3	Utilize	
C242.2	Utilize knowledge of curves and surfacing features and methods to create complex solid geometry	3	Utilize	
C242.3	Construct solid models, assemblies using various modelling techniques & perform mass property analysis, including creating and using a coordinate system	6	Construct	
C242.4	Apply geometric transformations to simple 2d geometries	3	Apply	
C242.5	Use cad model data for various cad based engineering applications viz. Production drawings, 3d printing, fea, cfd, mbd, cad, cam, etc.	3	Use	
C242.6	Use PMI & MBD approach for communication	3	Use	

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<b>Course:</b>	<b>Engineering Thermodynamics</b>	<b>Course Code: 202043</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C243.1	Describe the basics of thermodynamics with heat and work interactions.	2	Describe
C243.2	Apply laws of thermodynamics to steady flow and non-flow processes.	3	Apply
C243.3	Apply entropy, available and non available energy for an open and closed system,	3	Apply
C243.4	Determine the properties of steam and their effect on performance of vapour power cycle..	5	Determine
C243.5	Analyse the fuel combustion process and products of combustion.	4	Analyse
C243.6	Select various instrumentations required for safe and efficient operation of steam generator.	4	Select

<b>Course:</b>	<b>Engineering Materials and Metallurgy</b>	<b>Course Code: 202044</b>	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
Course Outcome Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C244.1	Compare crystal structures and assess different lattice parameters.	4	Compare	
C244.2	Correlate crystal structures and imperfections in crystals with mechanical behaviour of materials.	4	Correlate	
C244.3	Differentiate and determine mechanical properties using destructive and non- destructive testing of materials.	4	Differentiate	
C244.4	Identify & estimate different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. Etc.	5	Estimate	
C244.5	Analyse effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.	4	Analyse	
C244.6	Select appropriate materials for various applications.	4	Select	

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<b>Course:</b>	<b>Electrical and Electronics Engineering</b>	<b>Course Code:</b> 203156	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C256.1	Apply programming concepts to understand role of microprocessor and microcontroller in embedded systems	3	Apply
C256.2	Develop interfacing of different types of sensors and other hardware devices with atmega328 based arduino board	6	Develop
C256.3	Understand the operation of dc motor, its speed control methods and braking	2	Understand
C256.4	Distinguish between types of three phase induction motor and its characteristic features	4	Distinguish
C256.5	Explain about emerging technology of electric vehicle (ev) and its modular subsystems	2	Explain
C256.6	Choose energy storage devices and electrical drives for EVS	2	Choose

<b>Course:</b>	<b>Geometric Dimensioning and Tolerancing Lab</b>	<b>Course Code:</b> 202045	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C245.1	Select appropriate is and ASME standards for drawing	4	Select
C245.2	Read & analyse variety of industrial drawings	4	Analyse
C245.3	Apply geometric and dimensional tolerance, surface finish symbols in drawing	3	Apply
C245.4	Evaluate dimensional tolerance based on type of fit, etc.	5	Evaluate
C245.5	Select an appropriate manufacturing process using DFM, DFA, etc.	4	Select

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<b>Course:</b>	<b>Engineering Mathematics - III</b>	<b>Course Code:</b> 207002	<b>2019 Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 1Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C202.1	Solve higher order linear differential equations and its applications to model and analyze mass spring systems.	3	Solve
C202.2	Apply integral transform techniques such as laplace transform and fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications.	3	Apply
C202.3	Apply statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.	3	Apply
C202.4	Perform vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.	3	Perform
C202.5	Solve partial differential equations such as wave equation, one and two dimensional heat flow equations.	3	Solve

<b>Course:</b>	<b>Kinematics of Machinery</b>	<b>Course Code: 202047</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C247.1	Apply kinematic analysis to simple mechanisms	3	Apply
C247.2	Analyze velocity and acceleration in mechanisms by vector and graphical method	4	Analyze
C247.3	Synthesize a four bar mechanism with analytical and graphical methods	4	Synthesize
C247.4	Apply fundamentals of gear theory as a prerequisite for gear design	3	Apply
C247.5	Construct cam profile for given follower motion	6	Construct

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<b>Course:</b>	<b>Applied Thermodynamics</b>	<b>Course Code:202048</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C248.1	Determine cop of refrigeration system and analyze psychometric processes	4	Analyze
C248.2	Discuss basics of engine terminology, air standard, fuel air and actual cycles.	2	Discuss
C248.3	Identify factors affecting the combustion performance of SI and CI engines.	3	Identify
C248.4	Determine performance parameters of ic engines and emission control	5	Determine
C248.5	Explain working of various ic engine systems and use of alternative fuels.	2	Explain
C248.6	Calculate performance of single and multi-stage reciprocating compressors and discuss rotary positive displacement compressors	4	Calculate

<b>Course:</b>	<b>Fluid Mechanics</b>	<b>Course Code:202049</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C249.1	Determine various properties of fluid	4	Analyze
C249.2	Apply the laws of fluid statics and concepts of buoyancy	3	Apply
C249.3	Identify types of fluid flow and terms associated in fluid kinematics	2	Identify
C249.4	Apply principles of fluid dynamics to laminar flow	3	Apply
C249.5	Estimate friction and minor losses in internal flows and determine boundary layer formation over an external surface	5	Determine
C249.6	Construct mathematical correlation considering dimensionless parameters, also able to predict the performance of prototype using model laws	6	Construct

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<b>Course:</b>	<b>Manufacturing Processes</b>	<b>Course Code:202050</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C250.1	Select appropriate molding, core making and melting practice and estimate pouring time, solidification rate and design riser size and location for sand casting process	4	Select
C250.2	Understand mechanism of metal forming techniques and calculate load required for flat rolling		Calculate
C250.3	Demonstrate press working operations and apply the basic principles to design dies and tools for forming and shearing operations	6	Design
C250.4	Classify and explain different welding processes and evaluate welding characteristics	4	Evaluate
C250.5	Differentiate thermoplastics and thermosetting and explain polymer processing techniques	4	Differentiate
C250.6	Understand the principle of manufacturing of fibre-reinforce composites and metal matrix composites	2	Understand

<b>Course:</b>	<b>Machine Shop</b>	<b>Course Code:202051</b>	<b>2019 Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Practical Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C251.1	Perform welding using TIG/MIG/ resistance/gas welding technique	2	Perform
C251.2	Make fibre-reinforced composites by hand lay-up process or spray lay-up techniques	2	Make
C251.3	Perform cylindrical/surface grinding operation and calculate its machining time	2	Calculate
C251.4	Determine number of indexing movements required and acquire skills to produce a spur gear on a horizontal milling machine	3	Determine
C251.5	Prepare industry visit report	2	Prepare
C251.6	Understand procedure of plastic processing	2	Understand

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<b>Course:</b>	<b>Project Based Learning – II</b>	<b>Course Code:202052</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C252.1	Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.	3	Identify
C252.2	Analyze the results and arrive at valid conclusions.	4	Analyze
C252.3	Propose a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.	6	Propose
C252.4	Contribute to society through proposed solutions by strictly following professional ethics and safety measures.	2	Contribute
C252.5	Use of technology in proposed work and demonstrate learning in oral and written form	3	Use
C252.6	Develop ability to work as an individual and as a team member	6	Develop

### T.E.Mechanical Engineering

<b>Course:</b>	<b>Numerical and Statistical Methods</b>	<b>CourseCode:302041</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Tutorial Teaching Scheme: 1Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C341.1	Solve system of equations using direct and iterative numerical methods.	3	Solve
C341.2	Estimate solutions for differential equations using numerical techniques.	3	Estimate
C341.3	Develop solution for engineering applications with numerical integration.	6	Develop
C341.4	Design and create a model using a curve fitting and regression analysis.	6	Design
C341.5	Apply statistical technique for quantitative data analysis.	3	Apply
C341.6	Demonstrate the data, using the concepts of probability and linear algebra.	2	Demonstrate

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<b>Course:</b>	<b>Heat and Mass Transfer</b>	<b>CourseCode:302042</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C342.1	Analyze & apply the modes of heat transfer equations for one dimensional thermal system.	4	Analyze & Apply
C342.2	Design a thermal system considering fins, thermal insulation and & transient heat conduction.	6	Design
C 342.3	Evaluate the heat transfer rate in natural and forced convection & validate with experimentation results.	5	Evaluate
C 342.4	Interpret heat transfer by radiation between objects with simple geometries, for black and grey surfaces.	1	Interpret
C 342.5	Ability to analyze the rate of mass transfer using fick's law of diffusion and understands mass diffusion in different coordinate systems.	4	Analyze
C 342.6	Design & analysis of heat transfer equipments and investigation of its performance	6	Design

<b>Course:</b>	<b>Design of Machine Elements</b>	<b>Course Code:302043</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 343.1	Design and analyze the cotter and knuckle joints, levers and components subjected to eccentric loading.	6	Design
C 343.2	Design shafts, keys and couplings under static loading conditions.	6	Design
C 343.3	Analyze different stresses in power screws and apply those in the procedure to design screw jack.	4	Analyze
C 343.4	Evaluate dimensions of machine components under fluctuating loads.	3	Evaluate
C 343.5	Evaluate & interpret the stress developed on the different type of welded and threaded joints.	3	Evaluate
C 343.6	Apply the design and development procedure for different types of springs.	3	Apply

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<b>Course:</b>	<b>Mechatronics</b>	<b>Course Code: 302044</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 344.1	Define key elements of Mechatronics, principle of sensor and its characteristics.	1	Define
C 344.2	Utilize concept of signal processing and make use of interfacing systems such as ADC,DAC, digital i/o.	3	Utilize
C 344.3	Determine the transfer function by using block diagram reduction technique.	3	Determine
C 344.4	Evaluate poles and zero, frequency domain parameter for mathematical modeling for mechanical system.	3	Evaluate
C 344.5	Apply the concept of different controller modes to an industrial application.	3	Apply
C 344.6	Develop the ladder programming for industrial application.	6	Develop

<b>Course:</b>	<b>Advanced Forming &amp; Joining Processes</b>	<b>Course Code: 302045-A</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 345-A.1	Analyse the effect of friction in metal forming deep drawing and identification of surface defects and their remedies in deep drawing operations.	4	Analyse
C 345-A.2	Assess the parameters for special forming operation and select appropriate special forming operation for particular applications	3	Assess
C 345-A.3	Analyse the effect of HAZ on microstructure and mechanical properties of materials	4	Analyse
C 345-A.4	Classify various solid state welding process and select suitable welding processes for particular applications	4	Classify
C 345-A.5	Classify various advanced welding process and select suitable welding processes For particular applications.	4	Classify
C 345-A.6	Interpret the principles of sustainable manufacturing and its role in manufacturing Industry.	1	Interpret

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<b>Course:</b>	<b>Machining Science &amp; Technology</b>	<b>Course Code:302045-B</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 345-B.1	Define metal cutting principles and mechanics of metal cutting and tool life.	1	Define
C 345-B.2	Describe features of gear and thread manufacturing processes.	1	Describe
C 345-B.3	Select appropriate grinding wheel and demonstrate the various surface finishing processes.	3	Select
C 345-B.4	Select appropriate jigs/fixtures and to draw the process plan for a given component.	3	Select
C 345-B.5	Select & evaluate various parameters of process planning	5	Select
C 345-B.6	Generate CNC program for turning / milling processes and generate tool path using cam software.	6	Generate

<b>Course:</b>	<b>Digital Manufacturing Laboratory</b>	<b>Course Code:302046</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 346.1	Develop a component using conventional machines, CNC machines and additive manufacturing techniques.	6	Develop
C 346.2	Analyze cutting tool parameters for machining given job.	4	Analyze
C 346.3	Demonstrate simulation of manufacturing process using digital manufacturing tools	1	Demonstrate
C 346.4	Select and design jigs and fixtures for a given component.	6	Select
C 346.5	Demonstrate different parameters for CNC retrofitting and reconditioning	1	Demonstrate

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<b>Course:</b>	<b>Skill Development</b>	<b>Course Code:302047</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 347.1	Apply & demonstrate procedure of assembly & disassembly of various machines	3	Apply
C 347.2	Design & develop a working/model of machine parts or any new product.	6	Design
C 347.3	Evaluate fault with diagnosis on the machines, machine tools and home appliances.	3	Evaluate
C 347.4	Identify & demonstrate the various activities performed in an industry such as maintenance, design of components, material selection.	4	Identify

<b>Course:</b>	<b>Artificial Intelligence &amp; Machine Learning</b>	<b>CourseCode:302049</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 349.1	Demonstrate fundamentals of artificial intelligence and machine learning.	1	Demonstrate
C 349.2	Apply feature extraction and selection techniques.	3	Apply
C 349.3	Apply machine learning algorithms for classification and regression problems.	3	Apply
C 349.4	Devise and develop a machine learning model using various steps.	6	Devise
C 349.5	Explain concepts of reinforced and deep learning.	2	Explain
C 349.6	Simulate machine learning model in mechanical engineering problems.	3	Simulate

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<b>Course:</b>	<b>Computer Aided Engineering</b>	<b>CourseCode:302050</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
C 350.1	Define the use of CAE tools and describe the significance of shape functions in Finite element formulations.		2	Define,
C 350.2	Apply the various meshing techniques for better evaluation of approximate results.		3	Apply
C 350.3	Apply material properties and boundary condition to solve 1-d and 2-d element stiffness matrices to obtain nodal or elemental solution.		3	Apply
C 350.4	Analyze and apply various numerical methods for different types of analysis.		4	Analyze,
C 350.5	Evaluate and solve non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.		5	Evaluate,
C 350.6	Generate the results in the form of contour plot by the use of cae tools.		6	Generate

<b>Course: Elective VI-B</b>	<b>Design of Transmission Systems</b>	<b>Course Code:302051</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcome Code</b>	<b>Statements</b>		<b>Bloom's Taxonomy</b>	
			<b>Level</b>	<b>Descriptor</b>
C 351.1	Apply the principle of spur & helical gear design for industrial application and prepare a manufacturing drawing with the concepts of GD & T		3	Apply
C 351.2	Explain and design bevel & worm gear considering design parameters as per design standards.		6	Explain,
C 351.3	Select & design rolling and sliding contact bearings from manufacturer's catalogue for a typical application considering suitable design parameters		6	Select
C 351.4	Define and design various types of clutches, brakes, used in automobile.		6	Define
C 351.5	Apply various concept to design machine tool gear box, for different applications		6	Apply
C 351.6	Elaborate various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.		2	Elaborate

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<b>Course:</b> <b>Elective</b> <b>VI-C</b>	<b>Composite Materials</b>	<b>Course Code:302052-A</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E.</b> <b>Mechanical</b> <b>Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C 352-A.1	Define & compare composites with traditional materials.	4	Define
C 352-A.2	Identify & estimate different parameters of the polymer matrix composite	4	Identify
C 352-A.3	Categories and apply metal matrix process from possessions landscape.	3	Categories
C 352-A.4	Determine volume/weight fraction and strength of composites.	2	Determine
C 352-A.5	Select appropriate testing and inspection method for composite materials.	4	Select
C 352-A.6	SELECT composites materials for various applications.	4	Select

<b>Course:</b>	<b>Surface Engineering</b>	<b>Course Code 302052-B</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E.</b> <b>Mechanical</b> <b>Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C 352-B.1	Define the basic's principle & mechanism of surface degradation.	1	Define
C 352-B.2	Analyse & select correct corrosion prevention techniques for a different service condition.	4	Analyse
C 352-B.3	Demonstrate the role of surface engineering of materials to modify/improve the surface properties.	2	Demonstrate
C 352-B.4	Select the suitable surface heat treatments to improve the surface properties.	4	Select
C 352-B.5	Apply the surface modification technique to modify surface properties	3	Apply
C 352-B.6	Analyse & evaluate various surface coating defects using various testing/characterization method.	5	Analyse

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<b>Course:</b>	<b>Measurement Laboratory</b>	<b>CourseCode:302053</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 353.1	Evaluate causes of errors in verniercalipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.	5	Evaluate
C 353.2	Analyze strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.	4	Analyze
C 353.3	Examine surface textures, surface finish using equipment's like talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of verniercalipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.	4	Examine
C 353.4	Measure the dimensional accuracy using comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.	3	Measure
C 353.5	Perform testing of flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. To increase repeatability and reproducibility.	4	Perform
C 353.6	Compile the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report	3	Compile

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<b>Course:</b>	<b>Fluid Power &amp; Control Laboratory</b>	<b>CourseCode:302054</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 354.1	Define working principle of components used in hydraulic and pneumatic systems.	1	Define
C 354.2	Identify & explain various applications of hydraulic and pneumatic systems.	4	Identify
C 354.3	Select an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.	4	Select
C 354.4	Simulate & analyse various hydraulic and pneumatic systems for industrial/mobile applications.	4	Simulate
C 354.5	Design a hydraulic and pneumatic system for the industrial applications	6	Design
C 354.6	Design & demonstrate various IoT, PLC based controlling system using hydraulics and pneumatics.	6	Design

<b>Course:</b>	<b>Internship/Mini project</b>	<b>Course Code:302055</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>--</b>		

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C 355.1	Demonstrate professional competence through industry internship.	2	Demonstrate
C 355.2	Apply knowledge gained through internships to complete academic activities in a professional manner.	3	Apply
C 355.3	Choose appropriate technology and tools to solve given problem.	3	Choose
C 355.4	Demonstrate abilities of a responsible professional and use ethical practices in day to day life.	2	Demonstrate
C 355.5	Develop network and social circle, and developing relationships with industry people.	3	Develop
C 355.6	Analyze various career opportunities and decide career goals.	4	Analyze

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<b>Course:</b>	<b>Mini project</b>	<b>Course Code: 302055</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>T. E. Mechanical Engineering</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		

<b>Course Outcome Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
C 355.1	Explain plan and execute a mini project with team.	4	Explain
C 355.2	Implement hardware/software/analytical/numerical techniques, etc.	3	Implement
C 355.3	Develop a technical report based on the mini project.	6	Develop
C 355.4	Deliver technical seminar based on the mini project work carried out.	2	Deliver

### B.E.Mechanical Engineering

<b>Course:</b>	<b>Heating, Ventilation, Air Conditioning and Refrigeration</b>	<b>Course Code: 402041</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E .Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

<b>Course outcome code</b>	<b>Statement</b>	<b>Blooms Taxonomy</b>	
		<b>Level</b>	<b>Action Verb</b>
C441.1	Analyse different air-craft refrigeration systems and explain the properties, applications and environmental issues of different refrigerants.	4	Analyse
C441.2	Analyse multi pressure refrigeration system used for refrigeration applications.	4	Analyse
C441.3	.Discuss types of compressors, condensers, evaporators and expansion valves along with regulatory and safety controls and describes transcritical and ejector refrigeration systems.	6	Discuss
C441.4	Design air distribution system along with consideration of ventilation and infiltration.	6	Design
C441.5	Design air distribution system along with consideration of ventilation and infiltration	6	Design
C441.6	Explain the working of types of desiccants, evaporative, thermal storage, radiant cooling, Clean room and heat pump systems.	5	Explain

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<b>Course:</b>	<b>Dynamics of Machinery</b>	<b>Course Code: 402042</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E .Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C442.1	Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.	3	Apply
C442.2	Analyze the gyroscopic couple or effect for stabilization of ship, airplane and fourwheeler vehicles.	4	Analyze
C442.3	Estimate natural frequency for single dof un-damped & damped free vibratory systems.	6	Estimate
C442.4	Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces	5	Determine
C442.5	Estimate natural frequencies, mode shapes for 2 DOF un-damped free longitudinal and torsional vibratory systems	6	Estimate
C442.6	Describe noise and vibration measuring instruments for industrial / real life applications Along with suitable method for noise and vibration control.	3	Describe

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<b>Course:</b>	<b>Turbo machinery</b>	<b>Course Code: 402043</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 2 Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C443.1	Validate impulse moment principle using flat, inclined and curved surfaces and Investigate performance characteristics of hydraulic turbines.	5	Validate
C443.2	Determine performance parameters of impulse and reaction steam turbine along with discussion of nozzles, governing mechanism & losses	5	Determine
C442.3	Measure performance parameters of single & multistage centrifugal pumps along with discussion of cavitations and selection	3	Measure
C443.4	Explain performance parameters of centrifugal compressor along with discussion of theoretical aspects of axial compressor.	5	Explain

<b>Course:</b>	<b>Automobile Design</b>	<b>Course Code: 402044A</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C444A .1	Design of principal engine components	6	Design
C444A .2	Design of drive train	6	Design
C444A .3	Design of brakes and suspension	6	Design

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<b>Course:</b>	<b>Design of Heat Transfer Equipments</b>	<b>Course Code: 402044B</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C444B .1	Explain the design aspect of heat exchanger considering fouling factor for heattransfer applications	5	Explain
C444B .2	Select and design the double tube heat exchangers for process industry	3	Select
C444B .3	Design the shell & tube heat exchangers for specified conditions	6	Design
C444B .4	Design the condensers and evaporators for refrigeration applications	6	Design
C444B .5	Design the compact heat exchangers	6	Design
C444B .6	Analyse the performance of counter and cross flow cooling tower.	4	Analyse

<b>Course:</b>	<b>Modern Machining Processes</b>	<b>Course Code: 402044C</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C444C .1	Understand and analyze the mechanism, process parameters of mechanical assisted modern machining processes.	2	Understand
C444C .2	Understand the mechanism, construction and working of laser, plasma and electronbeam assisted machining.	2	Understand
C444C .3	Classify and analyze the mechanism, process parameters of the chemical and electrochemical machining	4	Classify
C444C .4	Relate and analyze the mechanism and select process parameters electrical discharge machining for an application	4	Relate
C444C.5	Illustrate the application of micromachining processes	2	Illustrate
C444C .6	Suggest appropriate nano machining process for the specific application.	3	Suggest

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<b>Course:</b>	<b>Industrial Engineering</b>	<b>Course Code: 402044D</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C444D.1	Evaluate the productivity and implement various productivity improvement techniques	5	Evaluate
C444D .2	Apply work study techniques and understands its importance for better productivity	3	Apply
C444D .3	Demonstrate the ability to select plant location, appropriate layout and material handling equipment.	2	Demonstrate
C444D .4	Use of production planning and control tools for effective planning, scheduling and managing the shop floor control.	3	Use
C444D.5	Plan inventory requirements and exercise effective control on manufacturing requirements	3	Plan
C444D.6	Apply ergonomics and legislations for human comfort at work place and understands the role of value engineering in improving productivity	3	Apply

<b>Course:</b>	<b>Internet of Things</b>	<b>Course Code: 402044E</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C444E.1	Explain the applications/devices, protocols and communication models of IoT	2	Explain
C444E .2	Demonstrate small mechanical engineering IoT oriented applications using sensors, actuators, microcontrollers and cloud	2	Demonstrate
C444E .3	Select commonly used IoT simulation hardware platforms	5	Select
C444E .4	Application of interfacing and communication technologies for IoT	3	Application
C444E.5	Illustrate IoT application development and security of IoT ecosystem	2	Illustrate
C444E.6	Evaluate present and future domain specific applications of IoT ecosystem	4	Evaluate

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<b>Course:</b>	<b>Computational Fluid Dynamics</b>	<b>Course Code: 402044F</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: -</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C444F.1	Distinguish and analyse the governing equations of fluid mechanics and heat transfer in various formulations	3	Distinguish
C444F.2	Analyze and model the conduction and advection problems	4	Analyze
C444F.3	Analyze and model the convection-diffusion problems	4	Analyze
C444F.4	Identify and evaluate the external/internal flow and its simulation	4	Identify
C444F.5	Distinguish and compare concepts of stability and turbulence.	4	Distinguish
C444F.6	Use and apply a CFD tool for effectively solving practical fluid-structure interaction problems	3	Use

<b>Course:</b>	<b>Product Design and Development</b>	<b>Course Code: 402045A</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C445A.1	Understand product design and product development processes	2	Understand
C445A.2	Understand processes, tools and techniques for market survey & product specification finalization	2	Understand
C445A.3	Understand processes, tools and techniques for concept inception, verification and selection	2	Understand
C445A.4	Understand processes, tools and techniques for concept exploration & development	2	Understand
C445A.5	Understand processes, tools and techniques for design verification and validation	2	Understand
C445A.6	Understand processes, tools and techniques for robust design and development	2	Understand

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<b>Course:</b>	<b>Experimental Methods in Thermal Engineering</b>	<b>Course Code: 402045B</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C445B .1	Identify the suitable instrument for measuring parameters as per performance characteristics	3	Identify
C445B .2	Analyze experimental data by using different statistical techniques and estimate error	4	Analyze
C445AB .3	Distinguish different methods of temperature measurements and thermal radiation	4	Distinguish
C445B .4	Classify various pressure measurement instruments and their comparison	2	Classify
C445B .5	Explain different flow measurement methods and flow visualization techniques	5	Explain
C445B .6	Apply knowledge of modern engineering experimentation, including calibration, data acquisition, analysis and interpretation using different AI and ML techniques	3	Apply

<b>Course:</b>	<b>Additive Manufacturing</b>	<b>Course Code: 402045C</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C445C .1	Use and classify the fundamentals of additive manufacturing technologies for engineering applications.	3	Use
C445C .2	Identify and categorize the methodology to manufacture the products using light-based photo-curing, laser based technologies and study their applications, benefits.	3	Identify
C445C .3	Identify and categorize the methodology to manufacture the products using extrusion-based deposition, inkjet-based technologies and study their applications, benefits.	3	Identify
C445C .4	Synthesize, recommend and design the suitable material and process for fabrication and build behavior of varieties of product.	5	Synthesize
C445C .5	Design and construct the am equipment's for appropriate applications and the input cad model.	6	Design
C445C .6	Develop the knowledge of additive manufacturing for various real-life applications.	6	Develop

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<b>Course:</b>	<b>Operations Research</b>	<b>Course Code: 402045D</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E .Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C445D .1	Evaluate various situations of games theory and decision techniques and apply them to solve them in real life for decision making.	5	Evaluate
C445D .2	Select appropriate model for queuing situations and sequencing situations and Find the optimal solutions using models for different situations.	3	Select
C445D .3	Formulate various management problems and solve them using linearprogramming using graphical method and simplex method	6	Formulate
C445D .4	Formulate variety of problems such as transportation, assignment, travelling salesman and solve these problems using linear programming approach	6	Formulate
C445D .5	Plan optimum project schedule for network models arising from a wide range of applications and for replacement situations find the optimal solutions using appropriate models for the situation	3	Plan
C445D.6	Apply concepts of simulation and dynamic programming	3	Apply

<b>Course:</b>	<b>Augmented Reality and Virtual Reality</b>	<b>Course Code: 402045E</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C445E .1	Understand fundamental computer vision, computer graphics and human- computer interaction techniques related to VR/AR	2	Understand
C445E .2	Understand geometric modeling techniques	2	Understand
C445E .3	Understand the virtual environment	2	Understand
C445E .4	Analyze and evaluate VR/AR technologies	4	Analyze
C445E .5	Apply various types of hardware and software in virtual reality systems	3	Apply
C445E.6	Design and formulate virtual/augmented reality applications	6	Design

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<b>Course:</b>	<b>Data Analytics Laboratory</b>	<b>Course Code: 402046</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

<b>Course outcome code</b>	<b>Statement</b>	<b>Blooms Taxonomy</b>	
		<b>Level</b>	<b>Action Verb</b>
C446 .1	Understand the basics of data analytics using concepts of statistics and probability.	2	Understand
C446 .2	Apply various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set.	3	Apply
C446 .3	Explore the data analytics techniques using various tools	3	Explore
C446 .4	Apply data science concept and methods to solve problems in real world context	3	Apply
C446 .5	Select advanced techniques to conduct thorough and insightful analysis and interpret the results	5	Select

<b>Course:</b>	<b>Project (Stage I)</b>	<b>Course Code: 402047</b>	<b>2019Pattern</b>	<b>Sem-I</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

<b>Course outcome code</b>	<b>Statement</b>	<b>Blooms Taxonomy</b>	
		<b>Level</b>	<b>Action Verb</b>
C447.1	Implement systems approach	5	Implement
C447 .2	To conceptualize a novel idea / technique into a product.	6	Conceptualize
C447 .3	To think in terms of a multi-disciplinary environment	6	Think
C447.4	To take on the challenges of teamwork, and document all aspects of design work	6	Challenges
C447 .5	To take on the challenges of teamwork, and document all aspects of design work	6	Challenges

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<b>Course:</b>	<b>Computer Integrated Manufacturing</b>	<b>Course Code: 402048</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C402048.1	Explain CIM and factory automation.	2	Explain
C402048 .2	Understand the integration of hardware and software elements for CIM	2	Understand
C402048 .3	Apply CNC program for appropriate manufacturing techniques.	3	Apply
C402048.4	Analyze processes planning, quality and MRP integrated with computers	4	Analyze
C402048 .5	Interpret flexible, cellular manufacturing and group technology	5	Interpret
C402048 .6	Analyze the effect of IoT, industry-4.0 and cloud base manufacturing	4	Analyze

<b>Course:</b>	<b>Energy Engineering</b>	<b>Course Code:402049</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B. E. Mech</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course Outcome Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C449.1	Explain the power generation scenario, the layout components of thermal power plant and analyze the improved rankine cycle.	2	Explain
C449.2	Analyze the performance of steam condensers, cooling tower system; recognize an environmental impact of energy systems and methods to control the same.	4	Analyze
C449.3	Explain the layout, component details of diesel engine plant, hydel and nuclear energy systems.	2	Explain
C449.4	Analyze gas and improved power cycles.	4	Analyze
C449.5	Explain the fundamentals of renewable energy systems.	2	Explain
C449.6	Explain basic principles of energy management, storage and economics of power generation.	2	Explain

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<b>Course:</b>	<b>Quality &amp; Reliability Engineering</b>	<b>Course Code: 402050A</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C450A .1	Understand basic concepts of quality and relate various quality tools	2	Understand
C450A .2	Develop analytical competencies to solve problems on control charts and process capability.	6	Develop
C450A .3	Understand fundamental concepts of reliability	2	Understand
C450A .4	Evaluate system reliability	5	Evaluate
C450A .5	Identify various failure modes and create fault tree diagram	3	Identify
C450A .6	Understand the concept of reliability centered maintenance and apply reliability tests Methods	2	Understand

<b>Course:</b>	<b>Energy Audit and Management</b>	<b>Course Code: 402050B</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C450B .1	Explain the energy need and role of energy management	5	Explain
C450B .2	Carry out an energy audit of the institute/industry/organization	6	Carry out
C450B .3	Assess the econ opportunities using energy economics	5	Assess
C450B .4	Analyse the energy conservation performance of thermal utilities	4	Analyse
C450B .5	Analyse the energy conservation performance of electrical utilities	4	Analyse
C450B .6	Explain the energy performance improvement by cogeneration and WHR method	5	Explain

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<b>Course:</b>	<b>Manufacturing System and Simulation</b>	<b>Course Code: 402050C</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E .Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: --</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C450C.1	Understand the concepts of manufacturing system, characteristics, type, etc.	2	Understand
C450C .2	Understand the concepts of facilities, manufacturing planning & control and supportsystem.	2	Understand
C450C.3	Understand the concepts of manufacturing towards solving productivity relatedproblems.	2	Understand
C450C.4	Develop a virtual model to solve industrial engineering related issues such as capacity. Utilization, line balancing	3	Develop
C450C.5	Building tools to view and control simulations and their results	3	Building
C450C .6	Plan the data representation & evaluate the results of the simulation	3	Plan

<b>Course:</b>	<b>Process Equipment Design</b>	<b>Course Code: 402051A</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C451A .1	Interpret the different parameters involved in design of process equipments.	2	Interpret
C451A .2	Analyze thin and thick walled cylinder	4	Analyze
C451A .3	Design cylindrical vessel, spherical vessel, tall vessels and thick walled highpressure vessels	6	Design
C451A.4	Design different process equipments and select pump, compressor etc. Andauxiliary services	6	Design
C451A .5	Evaluate process parameters and their correlation	5	Evaluate
C451A .6	Apply the concepts of process equipment design for specific applications	3	Apply

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<b>Course:</b>	<b>Electric and Hybrid Vehicle</b>	<b>Course Code: 402051E</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme:</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C451E .1	Understand the basics related to e-vehicle	2	<b>Understand</b>
C451E 2	Classify the different hybrid vehicles	4	<b>Classify</b>
C451E 3	Identify and evaluate the prime movers, energy storage and controllers	3	<b>Identify</b>
C451E .4	Discover and categorize the electric vehicle configuration with respect to propulsion, power distribution and drive-train topologies	6	<b>Discover</b>
C451E .5	Develop body frame with appropriate suspension system and testing of for e-vehicles	6	<b>Develop</b>
C451E .6	Classify and evaluate battery charging techniques and management	4	<b>Classify</b>

<b>Course:</b>	<b>Mechanical Systems Analysis Laboratory</b>	<b>Course Code: 402052</b>	<b>2019Pattern</b>	<b>Sem-II</b>
<b>Class:</b>	<b>B.E Mechanical Engineering</b>	<b>Theory Teaching Scheme:</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C452 .1	Develop an understanding of the systems engineering process and the range of factors that influence the product need.	6	Develop
C452 .2	Illustrate the concepts and use the developed skill-set of use of computational tools (FEA,CFD,MBD,MBD,FSI, CAE) to automate the complete product development process.	2	Illustrate

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C452 .3	Evaluate the knowledge of new developments and innovations in technological systems to carry forward to next stage of employment after passing your undergraduate degree examination.	5	Evaluate
C452 .4	Appraise how technologies have transformed people's lives and can be used to solve challenges associated with climate change, efficient energy use, security, health, education and transport, which will be coming your ways in the coming future.	5	Appraise
C452 .5	Prioritize the concept of quality and standards, including systems reliability, safety and fitness for the intended purpose	5	Prioritize
C452 .6	Invent yourself to face the challenges of future technologies and their associated problems	6	Invent

Course:	Project (Stage II)	Course Code: 402053	2019Pattern	Sem-II
Class:	B.E Mechanical Engineering	Theory Teaching Scheme:	Practical Teaching Scheme: 12Hrs/Week	

Course outcome code	Statement	Blooms Taxonomy	
		Level	Action Verb
C453 .1	Implement systems approach	6	Implement
C453 .2	To Conceptualize a novel idea / technique into a product	6	Conceptualize
C453 .3	To Think in terms of a multi-disciplinary environment	6	Think
C453.4	To Take on the challenges of teamwork, and document all aspects of design work.	6	Take
C453 .5	To Understand the management techniques of implementing a project	2	Understand

  
HoD  
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## Department of Automation and Robotics Engineering Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

Approved by AICTE, New Delhi vide Letter No. F-27-29/91-AICTE/US (PG)/6717 Dt. 20/09/1993

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

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

Graduates (4-5 years after graduation) will demonstrate ability to,

**PEO1:** To apply knowledge of Automation and Robotics Engineering to solve real time engineering problems.

**PEO2:** To design and develop interdisciplinary and innovative systems containing aesthetic, safety, cost and effectiveness.

**PEO3:** To work with effective communication skills, team work, ethics and lead to successful career in industry, research and higher studies.

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

**PSO1:** Design and develop Automation and Robotics Engineering systems.

**PSO2:** To conceive knowledge, hands on practice in multidisciplinary areas such as software's, robotics, Mechatronics, automation and it's applications in engineering.

**HoD**  
Head of Department  
Department of Automation &  
Robotics Engineering  
PREC, Loni- 413736

**Principal**  
Pravara Rural Engineering  
College, Loni



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Department of Automation and Robotics Engineering  
SE Automation and Robotics Engineering  
Course Outcomes (2019 Course)

Course:	Solid Mechanics	Course Code:204102	2019 Course	Sem-I
Class:	SE	Theory Teaching Scheme: 3Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C202.1	DEFINE various types of stresses and strain developed on determinate and indeterminate members.	1	Remember	
C202.2	DRAW Shear force and bending moment diagram for various types of transverse loading and support.	3	Apply	
C202.3	COMPUTE the slope & deflection, bending stresses and shear stresses on a beam	3	Apply	
C202.4	CALCULATE torsional shear stress in shaft and buckling on the column	3	Apply	
C202.5	APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element	3	Apply	
C202.6	UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems	3	Apply	

Course:	Solid Modeling and Drafting	Course Code:202042	2019 Course	Sem-I
Class:	SE	Theory Teaching Scheme: 3 Hrs/Week	Practical Teaching Scheme: 2Hrs/Week	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C242.1	UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management	3	apply	
C242.2	UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry	4	implement	
C242.3	CONSTRUCT solid models, assemblies using various modelling techniques & PERFORM mass property analysis, including creating and using a coordinate system	4	develop	
C242.4	APPLY geometric transformations to simple 2D geometries	3	apply	
C242.5	USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM	3	apply	
C242.6	USE PMI & MBD approach for communication	3	apply	



<b>Course:</b>	<b>Engineering Materials and Metallurgy</b>	<b>Course Code:202044</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C244.1	COMPARE crystal structures and ASSESS different lattice parameters.	2	Understand
C244.2	CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.	3	APPLY
C244.3	DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials	2	Understand
C244.4	IDENTIFY & ESTIMATE different parameters of the systemize phases, variables, component, grains, grain boundary, and degree of freedom.	2	Understand
C244.5	ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.	3	Implement
C244.6	SELECT appropriate materials for various applications.	3	Use

<b>Course:</b>	<b>Electrical Technology</b>	<b>Course Code: 202521</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C221.1	Explain the construction, working and applications of DC machines	2	Understand	
C221.2	Understand the construction, equivalent circuit and applications of transformers	2	Understand	
C221.3	The construction, operation, types and applications of induction motors	2	Understand	
C221.4	Understand the construction, working principle, applications and sizing of special motors	2	Understand	
C221.5	Explain the structure of electric power systems and EHV transmission systems	4	Explain	
C221.6	Understand the modelling of physical systems and transfer function of various components	2	Understand	



<b>Course:</b>	<b>Industrial Electronics</b>	<b>Course Code: 202522</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C222.1</b>	Interpret the role, benefits and types of automation in industries.	3	Apply	
<b>C222.2</b>	Understand the architecture, functions, objectives, bit instructions and applications of PLC.	2	Understand	
<b>C222.3</b>	Design of ladder programming with relay sequencers, timers/counters, HSC, PTO and PWM.	3	Apply	
<b>C222.4</b>	Analyze Batch processes and automation, Blending and ratio control, pH control, Fan / Compressor / Pump Control and Extruder control.	4	Analyze	
<b>C222.5</b>	Analysis of Communication protocols in industrial automation pyramid for PLC and HMI.	4	Analyze	
<b>C222.6</b>	Analyze the Characteristics of digital ICs, TTL logic family, CMOS logic and Inverter / logic gates.	4	Analyze	

<b>Course:</b>	<b>Geometric Dimensioning and Tolerance Lab</b>	<b>CourseCode: 202045</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>SE</b>		<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C245.1</b>	SELECT appropriate IS and ASME standards for drawing	2	Understand
<b>C245.2</b>	READ & ANALYSE variety of industrial drawings	4	Analyse
<b>C245.3</b>	APPLY geometric and dimensional tolerance, surface finish symbols in drawing	3	Apply
<b>C245.4</b>	EVALUATE dimensional tolerance based on type of fit	3	Evaluate
<b>C245.5</b>	SELECT an appropriate manufacturing process using DFM, DFA	3	Select



<b>Course:</b>	<b>Engineering Mathematics - III</b>	<b>CourseCode: 207002</b>	<b>2019 Course</b>	<b>Sem-I/II</b>
<b>Class:</b>	<b>SE</b>	<b>TheorTeaching Scheme: 3Hrs/Week</b>	<b>Tutorial Teaching Scheme: 1Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C207002.1</b>	SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.	<b>3</b>	Apply	
<b>C207002.2</b>	APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications	<b>4</b>	Apply	
<b>C207002.3</b>	APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control	<b>3</b>	Apply	
<b>C207002.4</b>	PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems.	<b>3</b>	Apply	
<b>C207002.5</b>	SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.	<b>3</b>	Apply	

<b>Course:</b>	<b>Kinematics of Machinery</b>	<b>Course Code: 202047</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: NIL</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C247.1</b>	APPLY kinematic analysis to simple mechanisms	<b>3</b>	Apply	
<b>C247.2</b>	ANALYZE velocity and acceleration in mechanisms by vector and graphical method	<b>3</b>	Use	
<b>C247.3</b>	SYNTHESIZE a four bar mechanism with analytical and graphical methods CO4	<b>3</b>	Apply	
<b>C247.4</b>	APPLY fundamentals of gear theory as a prerequisite for gear design	<b>3</b>	Apply	
<b>C247.5</b>	CONSTRUCT cam profile for given follower motion	<b>6</b>	Create	





<b>Course:</b>	<b>Fluid &amp; Thermal Engineering</b>	<b>Course Code: 202523</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C223.1	COMPARE various fluid properties in engineering applications	2	Analyse
C223.2	APPLY Bernoulli's equation to fluid flow problems	3	Apply
C223.3	INTERPRETE and UNDERSTAND issues related to fluid flow losses in hydraulic circuits	2	Understand
C223.4	SELECT appropriate control valve in automation circuits	2	Understand
C223.5	EXPLAIN working air compressors and USE of compressed air in pneumatic circuits CO6	2	Understand
C223.6	UNDRSTAND sources of heat and remedies of heat removal in electronic circuits	2	Understand

<b>Course:</b>	<b>202524 – Principles of Robotics</b>	<b>Course Code: 202524</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C224.1	UNDERSTAND basic concepts of robotics	2	Understand
C224.2	SELECT appropriate drive for Robotic applications.	3	Apply
C224.3	To COMPARE and SELECT robot and end effectors as per application	2	Understand
C224.4	To SELECT proper sensors for robot as per application requirement	2	Analyze
C224.5	To know about the basic mathematical modeling of robot	2	Analyze
C224.6	To know about the fundamentals of robot programming and applications	2	Apply



<b>Course:</b>	<b>Manufacturing Processes</b>	<b>Course Code: 202050</b>	<b>2019 Course</b>	<b>Sem-II</b>
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<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
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**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C250.1</b>	SELECT appropriate molding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process	<b>2</b>	Understand
<b>C250.2</b>	UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling	<b>2</b>	Understand
<b>C250.3</b>	DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations	<b>4</b>	Understand
<b>C250.4</b>	CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics	<b>2</b>	Understand
<b>C250.5</b>	. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques	<b>4</b>	Analyse
<b>C250.6</b>	UNDERSTAND the principle of manufacturing of fiber-reinforce composites and metal matrix composites	<b>2</b>	Understand

<b>Course:</b>	<b>Machine Shop</b>	<b>Course Code: 202051</b>	<b>2019 Course</b>	<b>Sem-II</b>
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<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
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**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C251.1</b>	PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique	<b>2</b>	Understand
<b>C251.2</b>	MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques	<b>3</b>	Apply
<b>C251.3</b>	PERFORM cylindrical/surface grinding operation and CALCULATE its machining time C	<b>4</b>	Demonstrate
<b>C251.4</b>	DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine	<b>2</b>	Understand



<b>C251.5</b>	PREPARE industry visit report.	3	Apply
<b>C251.6</b>	UNDERSTAND procedure of plastic processing	2	Understand

<b>Course:</b>	<b>Project Based Learning - II</b>	<b>Course Code: 202052</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>SE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Outcomes Course</b>				

**Course Outcomes**

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C252.1</b>	IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.	<b>2</b>	Identify
<b>C252.2</b>	ANALYZE the results and arrive at valid conclusions.	<b>4</b>	Analyze
<b>C252.3</b>	PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge	<b>3</b>	Apply
<b>C252.4</b>	CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.	<b>3</b>	Apply
<b>C252.5</b>	USE of technology in proposed work and demonstrate learning in oral and written form.	<b>3</b>	Use
<b>C252.6</b>	DEVELOP ability to work as an individual and as a team member.	<b>4</b>	Develop



### TE Automation and Robotics Engineering

<b>Course:</b>	<b>Design of Robot Element</b>	<b>CourseCode:30252</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Tutorial Teaching Scheme: 1Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C352.1</b>	UNDERSTAND design philosophy for basic components of the system	<b>2</b>	Understand	
<b>C352.2</b>	USE design considerations for designing components under fluctuating loads	<b>3</b>	Use	
<b>C352.3</b>	DESIGN basic machine elements viz. shafts, clutches, brakes, etc	<b>3</b>	Apply	
<b>C352.4</b>	SELECT and DESIGN robot end-effector as per the applications	<b>3</b>	Apply	
<b>C352.5</b>	UNDERSTAND power transmission devices and SELECT appropriate tool for power transmission	<b>3</b>	Understand	
<b>C352.6</b>	SELECT appropriate type of bearings for Robotic applications based on operating speed, loads, etc.	<b>3</b>	Apply	

<b>Course:</b>	<b>Robot Kinematics and Dynamics</b>	<b>Course Code:302522</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 4 Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C322.1</b>	UNDERSTAND the coordinate system used in robotics	<b>3</b>	Understand	
<b>C322.2</b>	USE link coordinates to decide the position of end effectors or tool	<b>2</b>	Understand	
<b>C322.3</b>	DESIGN the system with understanding and application of coordinate system	<b>2</b>	APPLY	
<b>C322.4</b>	SELECT and UNDERSTAND work envelope of robot and its trajectory planning	<b>2</b>	Understand	
<b>C322.5</b>	UNDERSTAND the dynamics of manipulator for design of robot	<b>2</b>	Understand	
<b>322.6</b>	UNDERSTAND the functions of control hardware and its architecture	<b>2</b>	Understand	





<b>Course:</b>	<b>Computer Aided Engineering and Manufacturing</b>	<b>CourseCode:302523</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C323.1	DEFINE the use of CAE tools and DESCRIBE the significance of shape functions infinite element formulations.	1	Remember	
C323.2	APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution	3	Apply	
C323.3	ANALYZE and APPLY various numerical methods for different types of analysis.	3	Apply	
C323.4	CREATE process plan and GENERATE Gand M code using CAM software tools	3	Apply	
C323.5	UNDRSTAND lean manufacturing tools and techniques	2	Understand	
C323.6	APPLY knowledge to do process planning and ESTIAMTE costing for the same	3	Apply	

<b>Course:</b>	<b>Signal Processing and Conditioning</b>	<b>CourseCode:302524</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C324.1	DEFINE key elements of mechatronics, principle of sensor and its characteristics.	2	Understand	
C324.2	UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.	3	Apply	
C324.3	DETERMINE the transfer function by using block diagram reduction technique.	2	Determine	
C324.4	EVALUATE Poles and Zero, frequency domain parameter for mathematical modeming for mechanical system.	3	Apply	
C324.5	APPLY the concept of different controller modes to an industrial application	3	Apply	
C324.6	DEVELOP the ladder programming for industrial application	3	Apply	



<b>Course:</b>	<b>Advanced Forming and Joining Processes</b>	<b>Course Code: 302525-A</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C325A.1</b>	ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations	<b>3</b>	Apply	
<b>C325A.2</b>	ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications	<b>3</b>	Apply	
<b>C325A.3</b>	ANALYSE the effect of HAZ on microstructure and mechanical properties of materials	<b>1</b>	Analyse	
<b>C325A.4</b>	CLASSIFY various solid state welding process and SELECT suitable welding processes for particular application	<b>2</b>	Demonstrate	
<b>C325A.5</b>	CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.	<b>3</b>	Apply	
<b>C325A.6</b>	INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry	<b>3</b>	INTERPRET	

<b>Course:</b>	<b>Optimization Techniques</b>	<b>Course Code: 302525-B</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C325B.1</b>	Identify the types of optimization problems and apply the calculus method to single variable problems	<b>3</b>	Apply	
<b>C325B.2</b>	Formulate the problem as Linear Programming problem and analyze the sensitivity of a decision variable	<b>3</b>	Apply	
<b>C325B.3</b>	Apply various linear and non-linear techniques for problem solving in various domain	<b>3</b>	Apply	
<b>C325B.4</b>	Apply multi-objective decision making methods for problem in manufacturing environment and other domain.	<b>3</b>	Apply	
<b>C325B.5</b>	Apply multi criterion decision making methods for problem in manufacturing environment and other domain	<b>3</b>	Apply	
<b>C325B.6</b>	Apply Modern Optimization tools	<b>3</b>	Apply	



<b>Course:</b>	<b>Robotics Programming Lab</b>	<b>Course Code:302526</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>PPractical Teaching Scheme: 2Hrs/Week</b>	

**Course Outcomes**

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C326.1</b>	Select Use of any robotic simulation software to model the different types of robots and calculate work volume for different robots	<b>3</b>	Apply
<b>C326.2</b>	Read and Analyze variety of industrial robots	<b>4</b>	Analyze
<b>C326.3</b>	Apply Concept of Robot design and program for different field application	<b>3</b>	Apply
<b>C326.4</b>	Evaluate the significance of industrial robot	<b>3</b>	Apply

<b>Course:</b>	<b>Skill Development</b>	<b>CourseCode:302047</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: NILL</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

**Course Outcomes**

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C347.1</b>	INTRODUCE the skills required in an industry such as design, development, assembly and disassembly	<b>3</b>	Apply
<b>C347.2</b>	DEVELOP the skills required for fault diagnose of engine and transmission of different automotive and various home appliances.	<b>2</b>	Develop
<b>C347.3</b>	ESTABLISH the skills required for maintenance of any machine tool	<b>3</b>	Apply
<b>C347.4</b>	CREATE awareness about industrial environment.	<b>1</b>	Understand



<b>Course:</b>	<b>Sensors and Vision Systems in Robots</b>	<b>CourseCode:302527</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C327.1	DETERMINE measurement of different parameters and measurement system behaviour	2	Understand
C327.2	DEFINE the principle of sensors and its types/characteristics.	2	Understand
C327.3	UNDERSTAND the vision based image classification, object recognition and object detection.	3	Apply
C327.4	UNDERSTAND how to improve image quality using image processing.	3	Apply
C327.5	UNDERSTAND how to extract useful information from image contents through processing	2	Understand
C327.6	UTILIZE the ROS and open CV Library.	3	Apply

<b>Course:</b>	<b>Artificial Intelligence in Robots</b>	<b>CourseCode:302528</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 4Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C328.1	To UNDERSTAND the basics of Artificial Intelligence, Intelligent Agents .	2	Understand
C328.2	To UNDERSTAND the basic forms of Machine Learning, decision trees and statistical Learning setting	2	Understand
C328.3	To UNDERSTAND the problem solving by various searching techniques	2	Understand
C328.4	To UNDERSTAND the application of Supervised Learning	2	Understand
C328.5	To APPLY the knowledge of AI and ML in Robotics	3	Apply
C328.6	To APPLY the knowledge of AI and ML for real time applications	3	Apply





<b>Course:</b>	<b>Modeling and Simulation</b>	<b>CourseCode:302529</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 1Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C329.1	Solve the problems based on simulation principal	2	Understand
C329.2	Differentiate the simulation systems	2	Understand
C329.3	Collect data and generate the random numbers.	3	Apply
C329.4	Distinguish simulations with regard to output analysis	3	Apply
C329.5	Apply simulation to manufacturing system	2	Understand
C329.6	Handle software packages – ARENA/SimFactory/Promodel/Witness	2	Understand

<b>Course:</b>	<b>Machining Science and Technology</b>	<b>CourseCode:302530-A</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: NILL</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C330A.1	ANALYZE cutting forces in turning and learn problem solving skills in both analytical and graphical methods.	4	Analyze
C330A.2	CATEGORIZE cutting force measuring instruments and choose them for a particular application	4	Analyze
C330A.3	UNDERSTAND Outline tool wear, tool geometry, tool temperature and parameters influencing tool life.	2	Understand
C330A.4	ANALYSE cutting forces	4	Analyze
C330A.5	UNDERSTAND concept of Estimates of machining costs	2	Understand
C330A.6	UNDERSTAND Modern machining techniques	2	Understand



<b>Course:</b>	<b>Maintenance and Safety Engineering</b>	<b>CourseCode:302530-B</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: NILL</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

**Course Outcomes**

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C330B.1</b>	SELECT the relevant safety plan and procedure for industry.	<b>3</b>	Apply
<b>C330B.2</b>	USE the different hazard assessment technique in Chemical industry	<b>4</b>	Analyze
<b>C330B.3</b>	PREPARE accident investigation reports in Chemical Industry	<b>3</b>	Apply
<b>C330B.4</b>	USE hazard control methods for industrial hazards.	<b>3</b>	Apply
<b>C330B.5</b>	USE the relevant maintenance procedure in Chemical process plant	<b>2</b>	Use
<b>C330B.6</b>	UNDERSTAND safety aspects in industrial operations	<b>2</b>	Understand

<b>Course:</b>	<b>Computer Aided Digital Manufacturing Laboratory</b>	<b>CourseCode:302532</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C332.1</b>	DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.	<b>3</b>	Apply
<b>C332.2</b>	ANALYZE cutting tool parameters for machining given job	<b>4</b>	Analyze
<b>C332.3</b>	DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools	<b>3</b>	Demonstrate
<b>C332.4</b>	SELECT and DESIGN jigs and Fixtures for a given component.	<b>3</b>	Apply
<b>C332.5</b>	DEMONESTRATE different parameters for CNC retrofitting and reconditioning	<b>3</b>	Demonstrate



<b>Course:</b>	<b>Internship</b>	<b>CourseCode:302055</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>TE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
<b>C355.1</b>	DEMONSTRATE professional competence through industry internship.	<b>2</b>	Apply
<b>C355.2</b>	APPLY knowledge gained through internships to complete academic activities in a professional manner	<b>3</b>	Apply
<b>C355.3</b>	. CHOOSE appropriate technology and tools to solve given problem	<b>3</b>	Apply
<b>C355.4</b>	DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.	<b>2</b>	Apply
<b>C355.5</b>	DEVELOP network and social circle, and DEVELOPING relationships with industry people.	<b>6</b>	Create
<b>C355.6</b>	ANALYZE various career opportunities and DECIDE career goals	<b>4</b>	Analyze

### BE Automation And Robotics Engineering

<b>Course:</b>	<b>Industrial Automation &amp; Control Systems</b>	<b>CourseCode:40254</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
<b>C454.1</b>	SELECT control systems in robots	<b>2</b>	Understand	
<b>C454.2</b>	DESIGN Hydraulic Control System	<b>3</b>	Use	
<b>C454.3</b>	DESIGN Pneumatic Control System	<b>3</b>	Apply	
<b>C454.4</b>	ANALYZE linear control system	<b>4</b>	Analyze	
<b>C454.5</b>	ANALYZE non-linear control system	<b>4</b>	Analyze	
<b>C454.6</b>	UNDERSTAND and USE appropriate control systems	<b>3</b>	Use	



<b>Course:</b>	<b>Robotic Process Automation &amp; Development</b>	<b>CourseCode:402542</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: 4 Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C442.1</b>	DESCRIBE RPA, where it can be applied and how it's implemented.	<b>3</b>	Understand	
<b>C442.2</b>	DESCRIBE the different types of variables, Control Flow and data manipulation techniques.	<b>2</b>	Understand	
<b>C442.3</b>	IDENTIFY and understand Image, Text and Data Tables Automation.	<b>2</b>	APPLY	
<b>C442.4</b>	DESCRIBE how to handle the User Events and various types of Exceptions and strategies	<b>2</b>	Understand	
<b>C442.5</b>	UNDERSTAND the Deployment of the Robot and maintain the connection	<b>2</b>	Understand	
<b>C442.6</b>	UNDERSTAND need of deployment and maintenance of bots	<b>2</b>	Understand	

<b>Course:</b>	<b>Artificial Neural Network and Deep Learning</b>	<b>CourseCode:402543</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C443.1</b>	UNDERSTAND the basic features of neural systems and be able to build the neural model.	<b>2</b>	Understand
<b>C443.2</b>	PERFORM the training of neural networks using various learning rules	<b>3</b>	APPLY
<b>C443.3</b>	GRASPING the use of Associative Learning Neural Network	<b>2</b>	Understand
<b>C443.4</b>	DESCRIBE the concept of Competitive Neural Networks CO	<b>2</b>	Understand
<b>C443.5</b>	IMPLEMENT the concept of Convolutional Neural Networks and its models C	<b>3</b>	Implement
<b>C443.6</b>	USE a new tool /tools to solve a wide variety of real-world problems	<b>3</b>	Use





<b>Course:</b>	<b>Robotics: Cognitive &amp; Medical (Elective- III)</b>	<b>CourseCode:402544A</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C444A.1</b>	IDENTIFY the type of medical robots and the concepts involved in it.	<b>2</b>	Understand	
<b>C444A.2</b>	DEFINE the applications of surgical robotics	<b>3</b>	Define	
<b>C444A.3</b>	PURPOSE of Rehabilitation interface	<b>2</b>	Purpose	
<b>C444A.4</b>	CLASSIFY the types of assistive robots.	<b>4</b>	Analyse	
<b>C444A.5</b>	ANALYZE the design characteristics, methodology and technological choices for medical robots	<b>4</b>	Analyze	

<b>Course:</b>	<b>Additive Manufacturing (Elective- IV)</b>	<b>CourseCode: 402045C</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C445C.1</b>	USE and CLASSIFY the fundamentals of Additive Manufacturing Technologies for engineering applications.	<b>3</b>	Apply	
<b>C445C.2</b>	IDENTIFY and CATEGORIZE the methodology to manufacture the products using light-based photo-curing, LASER based technologies and STUDY their applications, benefits	<b>3</b>	Understand	
<b>C445C.3</b>	IDENTIFY and CATEGORIZE the methodology to manufacture the products using extrusion-based deposition, inkjet-based technologies and STUDY their applications, benefits.	<b>2</b>	Understand	
<b>C445C.4</b>	SYNTHESIZE, RECOMMEND and DESIGN the suitable material and process for fabrication and build behavior of verities of product	<b>2</b>	Demonstrate	
<b>C445C.5</b>	DESIGN and CONSTRUCT the AM equipment's for appropriate applications and the input CAD model. CO6.	<b>6</b>	Design	
<b>C445C.6</b>	DEVELOP the knowledge of additive manufacturing for various real-life applications	<b>4</b>	Develop	



<b>Course:</b>	<b>Data Analytics Laboratory</b>	<b>CourseCode:402046</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C446.1</b>	UNDERSTAND the basics of data analytics using concepts of statistics and probability.	<b>2</b>	Understand	
<b>C446.2</b>	APPLY various inferential statistical analysis techniques to describe data sets and withdraw useful conclusions from acquired data set	<b>3</b>	Apply	
<b>C446.3</b>	EXPLORE the data analytics techniques using various tools	<b>3</b>	Apply	
<b>C446.4</b>	APPLY data science concept and methods to solve problems in real world context	<b>3</b>	Apply	
<b>C446.5</b>	SELECT advanced techniques to conduct thorough and insightful analysis and interpret the results	<b>3</b>	Apply	

<b>Course:</b>	<b>Project (Stage I)</b>	<b>CourseCode: 402547</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>BE</b>	<b>Practical Teaching Scheme: 4Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C447.1</b>	IMPLEMENT systems approach.	<b>3</b>	Apply	
<b>C447.2</b>	CONCEPTUALIZE a novel idea / technique into a product	<b>4</b>	Analyze	
<b>C447.3</b>	THINK in terms of a multi-disciplinary environment.	<b>3</b>	Apply	
<b>C447.4</b>	TAKE ON the challenges of teamwork, and DOCUMENT all aspects of design work	<b>3</b>	Apply	
<b>C447.5</b>	UNDERSTAND the management techniques of implementing a project	<b>2</b>	Understand	
<b>C447.6</b>	DEMONSTRATE the final product for Functionality, Design ability, and Manufacturability	<b>4</b>	Demonstrate	



<b>Course:</b>	<b>Embedded Systems in Robots</b>	<b>CourseCode:402549</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: NILL</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C449.1	DEFINE architecture, characteristics and classification of embedded systems.	2	Understand
C449.2	UTILIZE 'Embedded C' programming language to maintain embedded systems	3	Use
C449.3	EXPLAIN the communication standards and protocols of embedded systems.	3	Apply
C449.4	ANALYZE selection of the relevant microcontrollers for various industrial applications	4	Analyze
C449.5	ANALYZE selection of Open Source Embedded Development Board as Arduino	4	Analyze
C449.6	DEVELOP various applications of embedded systems.	4	Develop

<b>Course:</b>	<b>Fundamentals of Autonomous System</b>	<b>CourseCode:402550</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>BE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C450.1	DISTINGUISH between systems, agents, and issues when modelling autonomous systems.	2	Understand
C450.2	VALIDATE the principles of fundamental structure and artificial organism kinds.	2	Validate
C450.3	EXAMINE the effects of autonomous system layers with agentification	3	EXAMINE
C450.4	DISCUSS the importance of understanding systems and behavioral learning	3	Discuss
C450.5	RECOGNIZE existing representations and trends in autonomous systems.	2	Understand
C450.6	UNDERSTAND the concept of notions of scaled-down autonomous systems.	2	Understand
C450.7	EXPLAIN distributed autonomous systems' autonomy	2	Explain



Course:	Product Design & Development (Elective- V)	CourseCode:402045A	2019 Course	Sem-II
Class:	BE	Theory Teaching Scheme: 3Hrs/Week		
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C445A.1	UNDERSTAND Product Design and Development process in Robotics	2	Understand	
C445A.2	USE Processes, tools and techniques for Market Survey & Product Specification Finalization	3	Apply	
C445A.3	EXPLAIN the Processes, tools and techniques for Concept Generation, Validation, Selection, and Exploration	2	Understand	
C445A.4	UNDERSTAND the concept of Economics Considerations and Value Engineering	2	Understand	
C445A.5	APPLY Processes, tools and techniques for Robust Design and Development for robots	3	Apply	
C445A.6	USE Processes, tools and techniques for Design Documentation and Organization	3	Apply	

Course:	Internet of Things (Elective VI)	CourseCode:402044E	2019 Course	Sem-II
Class:	BE	Theory Teaching Scheme: 3Hrs/Week		
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C444E.1	EXPLAIN the Applications/Devices, Protocols and Communication Models of IoT	2	Understand	
C444E.2	DEMONSTRATE small Mechanical Engineering IoT oriented applications using Sensors, Actuators, Microcontrollers and Cloud	2	Understand	
C444E.3	SELECT commonly used IoT Simulation Hardware platforms	1	Remember	
C444E.4	APPLICATION of Interfacing and Communication Technologies for IoT	3	Apply	
C444E.5	ILLUSTRATE IoT Application Development and Security of IoT Ecosystem	4	Analyze	
C444E.6	EVALUATE Present and Future Domain specific Applications of IoT Ecosystem	5	Evaluate	

  
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## Department of First Year Engineering

### Programme Outcomes (POs)

Instrumentation and Control Engineering Graduates will be able to:

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

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PRAVARA RURAL EDUCATION SOCIETY  
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**LONI**

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

(Mr. A.P. Lohdhe)  
F.E. Coordinator

**F.E. Co-Ordinator**  
**Pravara Rural Engineering College**  
**LONI-413736, Dist. Ahmednagar**

**Principal**  
**Pravara Rural Engineering**  
**College, Loni**



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Pravara Rural Engineering College, Loni  
Course Outcomes (2019 Course)  
First Year Engineering

Course:	Engineering Mathematics-I	CourseCode:107001	2019 Course	Sem-I
Class:	FE	Theory Teaching Scheme: 3Hrs/Week	Tutorial Teaching Scheme: 1Hrs/Week	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements		Bloom's Taxonomy	
			Level	Descriptor
C101.1	Apply and solve problems using the Mean Value Theorems, Taylor's and McLaurin's series and Indeterminate forms		3	Apply
C101.2	Solve problems of Fourier series, both analytically and numerically.		3	Solve
C101.3	Apply the concept of partial derivatives to functions of several variables in various mathematical contexts.		3	Apply
C101.4	Solve the problems of Jacobian in applications such as functional dependence, error analysis, approximation, and determining extreme values of functions.		3	Solve
C101.5	Solve systems of linear equations and apply matrix theory to find linear and orthogonal transformations.		3	Solve
C101.6	Solve problems of eigenvalues and eigenvectors of a matrix.		3	Solve

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<b>Course:</b>	<b>Engineering Physics</b>	<b>CourseCode:100702</b>	<b>2019 Course</b>	<b>Sem-I &amp;II</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: 4 Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C102.1</b>	Understand the concept of interference, diffraction and polarization and illustrate these phenomena with examples from engineering applications such as optical instruments and communication technologies.	2	Understand	
<b>C102.2</b>	Apply the basics of lasers and optical fibers to investigate their applications in fields like telecommunications, medicine, and manufacturing.	2	Understand	
<b>C102.3</b>	Explain the basic concepts and principles of quantum mechanics and relate these concepts to practical applications in areas such as quantum computing and nanotechnology.	1	Remember	
<b>C102.4</b>	Understand theory of semiconductors and their applications in some semiconductor devices.	2	Understand	
<b>C102.5</b>	Explore the basics of magnetism and superconductivity and apply their technological applications in areas such as magnetic storage and superconducting magnets.	3	Explore	
<b>C102.6</b>	Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of Nano materials and their application.	2	Understand	

<b>Course:</b>	<b>System in mechanical Engineering</b>	<b>CourseCode:102003</b>	<b>2019 Course</b>	<b>Sem-I/II</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C103.1</b>	Describe and compare the conversion of energy from renewable and Non renewable Energy Sources	2	Understand
<b>C103.2</b>	Explain basic laws of thermodynamics ,heat transfer and their application	2	Understand
<b>C103.3</b>	List down the type of vehicles and their specifications	3	Apply

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<b>C103.4</b>	Illustrate various basic parts and transmission system of road vehicle	3	Apply
<b>C103.5</b>	Discuss several manufacturing processes and identify the suitable process	2	Understand
<b>C103.6</b>	Explain various types of mechanism and its application	2	Understand

<b>Course:</b>	<b>Basic Electrical Engineering</b>	<b>CourseCode:103004</b>	<b>2019 Course</b>	<b>Sem-I/II</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	

**Course Outcomes**

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C104.1</b>	Understand differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect	2	Understand
<b>C104.2</b>	Understand the calculation of series , parallel and composite capacitor and construction and working of single phase transformer	2	Understand
<b>C104.3</b>	Derive expression for impedance, current, power in series and parallel RLC circuits with AC supply along with phasor diagram	2	Understand
<b>C104.4</b>	Analyze transformer performance under various load conditions..	3	Apply
<b>C104.5</b>	Apply and analyze the resistive circuits using star Delta conversion KVL , KCL and different network theorems under DC supply	3	Apply
<b>C104.6</b>	Evaluate work, power and energy relations and Suggest various batteries for different applications, concept of charging and discharging & depth of charge.	3	Apply

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<b>Course:</b>	<b>Programming and Problem Solving</b>	<b>Course Code: 110005</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>		
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C105.1</b>	Inculcate and apply various skills in problem solving	3	Apply	
<b>C105.2</b>	Choose most appropriate programming constructs and features to solve the problems in diversified domains.	3	Choose	
<b>C105.3</b>	Exhibit the programming skills for the problems that require the writing of well-documented programs including use of the logical constructs of language, Python.	1	Exhibit	
<b>C105.4</b>	Demonstrate significant experience	2	Demonstrate	

<b>Course:</b>	Workshop practice	<b>Course Code: 111006</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: Nil</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C106.1</b>	Familiar with safety norms to prevent any mishap in workshop.	3	Apply
<b>C106.2</b>	Able to handle appropriate hand tools, cutting tools and machine tools to manufacture a job.	3	Apply
<b>C106.3</b>	Able to understand the construction, working and functions of machine tools and their parts.	3	Apply
<b>C106.4</b>	Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.	3	Apply

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<b>Course:</b>	Engineering Mathematics-II	<b>CourseCode:107008</b>	<b>2019 Course</b>	<b>Sem-II</b>
<b>Class:</b>	FE	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Tutorial Teaching Scheme: 1Hrs/Week</b>	
<b>Course Outcomes</b>				
Course Outcomes Code	Statements	Bloom's Taxonomy		
		Level	Descriptor	
C108.1	Solve first-order differential equations and apply them to various engineering problems.	3	Solve	
C108.2	Apply mathematical models for engineering applications using Differential equations.	3	Apply	
C108.3	Solve integrals using Beta and Gamma functions in various engineering areas.	3	Solve	
C108.4	Apply curve tracing techniques to determine and sketch the approximate shapes of curves.	3	Apply	
C108.5	Apply 3D geometry to solve problems related to cones, cylinders, and spheres in engineering contexts	3	Apply	
C108.6	Solve problems involving double and triple integrals and use them to calculate area, volume, center of gravity (CG), and moment of inertia (MI).	3	Solve	

<b>Course:</b>	Engineering Chemistry	<b>CourseCode:107009</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	FE	<b>Theory Teaching Scheme: 4Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C109.1	Understand the Hardness, alkalinity methods for analysis of water and techniques involved in softening of water as commodity	2	Understand
C109.2	Select electro-analytical method such as pH meter, Conductometry for material analysis	2	Understand
C109.3	Demonstrate the knowledge of advanced engineering materials such as polymer and nano materials for engineering applications	1	Remember
C109.4	Illustrate the solid, liquid and gaseous fuel and use of Power alcohol and biodiesel as alternative fuels.	2	Understand
C109.5	Understand the chemical compounds based on their structure using UV-Visible and IR Spectroscopy	2	Understand
C109.6	Understand the mechanism of corrosion and choose a proper method for controlling corrosion based on environmental conditions	2	Understand

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<b>Course:</b>	<b>Basic Electronics Engineering</b>	<b>Course Code:104010</b>	<b>2019 Course</b>	<b>Sem-I/II</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: 3Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				
<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>		
		<b>Level</b>	<b>Descriptor</b>	
<b>C110.1</b>	Understand basics of electronics, working of PN junction diode, special purpose diode, and their application.	2	Understand	
<b>C110.2</b>	Describe the construction, types, working and characteristics of BJT, MOSFET and Op amp with its Application.	2	Understand	
<b>C110.3</b>	Apply the knowledge of logic gates and implement any logic equation and digital circuits	3	Apply	
<b>C110.4</b>	Understand and apply the different electronics measuring instruments for measurement various parameters	3	Apply	
<b>C110.5</b>	Illustrate and Distinguish the different transducers and their application.	2	Understand	
<b>C110.6</b>	Discuss basic principles of communication systems.	2	Understand	

<b>Course:</b>	<b>Engineering Mechanics</b>	<b>CourseCode:101011</b>	<b>2019 Course</b>	<b>Sem-I</b>
<b>Class:</b>	<b>FE</b>	<b>Theory Teaching Scheme: 4Hrs/Week</b>	<b>Practical Teaching Scheme: 2Hrs/Week</b>	
<b>Course Outcomes</b>				

<b>Course Outcomes Code</b>	<b>Statements</b>	<b>Bloom's Taxonomy</b>	
		<b>Level</b>	<b>Descriptor</b>
<b>C111.1</b>	Determine resultant of various force systems using law of parallelogram, resolution and composition	3	Apply
<b>C111.2</b>	Determine centroid, moment of inertia and solve problems related to friction	3	Apply
<b>C111.3</b>	Determine equilibrium of Parallel, concurrent and general forces, apply principles of equilibrium to forces in space	3	Apply
<b>C111.4</b>	Solve trusses, frames for finding member forces, calculate forces in cables using principles of equilibrium	3	Apply
<b>C111.5</b>	Calculate position, velocity and acceleration of particle using principles of kinematics.	3	Apply
<b>C111.6</b>	Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy.	3	Apply

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Course:	Engineering Graphics	CourseCode:102012	2019 Course	Sem-I/II
Class:	FE	Theory Teaching Scheme: 1Hrs/Week TUT : 01 Hr/Week	Practical Teaching Scheme: 2Hrs/Week	
<b>Course Outcomes</b>				

Course Outcomes Code	Statements	Bloom's Taxonomy	
		Level	Descriptor
C112.1	Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.	2	Understand
C112.2	Construct the various engineering curves using the drawing instruments.	2	Understand
C112.3	Apply the concept of orthographic projection of an object to draw several 2D views for visualizing the physical state of object.	3	Apply
C112.4	Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment	3	Apply
C112.5	Draw the development of lateral surfaces for cut section of geometrical solids.	2	Understand
C112.6	Draw fully-dimensioned 2D,3D drawings using computer aided drafting tools.	2	Understand

(Mr.A.P.Londhe)  
F.E.Cordinator

**F.E. Co-Ordinator**  
Pravara Rural Engineering College  
LONI-413736, Dist.Ahmednagar

Principal  
Pravara Rural Engineering  
College, Loni



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