

## 1. VISION MISSION OF INSTITUTE



Rajgad Dnyanpeeth's  
**Shri Chhatrapati Shivajiraje College of Engineering**  
S.No.237, Dhangwadi, Tal-Bhor, Dist-Pune

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### VISION & MISION OF INSTITUTE

#### VISION

Excellent Institution for Education, Training and Research in Engineering.

#### MISSION

1. Develop competent engineers along with professional skill and responsible citizen.
2. Foster knowledge and technical skill of the highest standards to develop sustainable engineering solution.
3. Prepare engineers to respond to needs if the industry, higher studies and research through industry and institute interaction.





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**Shri Chhatrapati Shivajiraje College of Engineering**

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**DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING**

**VISION & MISSION OF DEPARTMENT**

**VISION**

Excellence in Electronics and Telecommunication Engineering to fulfill expectation of Industries and Society.

**MISSION**

1. Develop zealous Electronics and Telecommunications engineer with good communication skill, social and ethical values for development of society.
2. Promote quality technical education to reach at the highest standard.
3. Prepare and nurture the mind for civil services, higher studies and research activity.
4. Endorse exposure to advanced network standards for sustainable developments.





**Rajgad Dnyanpeeth's**  
**SHRI CHHATRAPATI SHIVAJIRAJE COLLEGE OF ENGINEERING**  
S. No. 237, Satara-Pune, NH-4, Dhangawadi, Tal: Bhore, Dist: Pune -412205 (MS), India.

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## **DEPARTMENT OF MECHANICAL ENGINEERING**

### **Vision**

Excellence in Mechanical Engineering to accept the global challenges.

### **Mission**

1. Develop spirited Mechanical Engineers with good communication skill, social and ethical values for development of society.
2. Impart continuously quality technical education of the highest standards.
3. Prepare and nurture the mind set for civil services, higher studies and research activity.
4. Promote exposure to green technology for sustainable development.





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## DEPARTMENT OF COMPUTER ENGINEERING

### VISION AND MISSION OF DEPARTMENT

#### **Vision**

- Excellence in Computer Engineering to meet Industrial and societal needs.

#### **Mission**

- Develop competent Computer Engineers with good communication skill, social and ethical values for development of society.
- Cultivate quality technical education to reach at the highest standard.
- Prepare and nurture the mind set for all civil services, higher studies and research activity.
- Promote exposure to green computing for developing sustainability standards.





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**Department of Civil Engineering**

**VISION:**

Excellence in Civil Engineering to develop smarter and sustainable infrastructure.

**MISSION:**

1. Develop passionate Civil Engineers with good communication skill, social and ethical values for development of society.
2. Inculcate quality technical education of the highest standards.
3. Prepare and nurture the mind set for civil services, higher studies and research activity.
4. Promote exposure to green technology for eco-friendly environment.





### 3. PROGRAM OUTCOMES

Rajgad Dnyanpeeth's  
**Shri Chhatrapati Shivajiraje College of Engineering**  
S.No.237, Dhangwadi, Tal-Bhor, Dist-Pune

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#### DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

#### Programme Outcomes (PO's)

Graduate will be able to:

**PO1:** Apply knowledge of mathematics, science and engineering with focus on electronics and telecommunication engineering.

**PO2:** Design and conduct experiments, analyze and interpret data and document the result.

**PO3:** To identify, formulate and solve the electronics and telecommunication engineering problems.

**PO4:** Lead and manage multidisciplinary teams by applying engineering management and finance principles to handle the projects.

**PO5:** Realize and follow the ethical principles, responsibilities and norms of engineering practice.

**PO 6:** Communicate effectively and present technical information in oral and written forms.

**PO7:** Apply engineering solution in society and global contest and evaluate the impact of engineering solution on society, health, safety, legal, cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO8:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO9:** Make use of modern engineering software and equipments to apply in electronics and telecommunication.

**PO10:** Have knowledge of contemporary issue.

**PO11:** To engage in lifelong learning this maintains continuous professional development.

**PO12:** Participate and succeed in competitive examinations.





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**Shri Chhatrapati Shivajiraje College of Engineering**

Gat. No. 237, Pune- Bangalore Highway, Dhangawadi, Tal- Bhor, Dist- Pune (Maharashtra)

**DEPT. OF ELECTRONICS AND TELECOMMUNICATION ENGG.****Program Specific Outcomes (PSO'S) of Department**

**PSO 1:** Should be able to understand the fundamental concepts in electronics circuit/ product design, networking techniques, IC design, embedded systems, and signal processing.

**PSO 2:** Should be able to apply the learning, analyze the communication systems with the help of hardware and software design tools.

**PSO 3:** Should be able to handle the project work and prepare engineering project module.





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**DEPARTMENT OF MECHANICAL ENGINEERING**

**Programme Specific Outcomes (PSO's)**

**PSO 1:** Apply their knowledge in the domain of engineering Design, Production and Thermal fluid sciences to solve engineering problems utilizing advanced technology.

**PSO 2:** Successfully apply the principles of design, analysis and implementation of mechanical systems which have been learned as a part of the curriculum.

**PSO 3:** Develop and implement new ideas on product design and development with the help of modern CAD/CAM/CAE tools ensuring best practices.







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### DEPARTMENT OF COMPUTER ENGINEERING

#### Program Specific Outcomes:

**PSO1:** Professional Skills-The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying.

**PSO2:** Problem-Solving Skills- The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

**PSO3:** Successful Career and Entrepreneurship- The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies





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## SHRI CHHATRAPATI SHIVAJIRAJE COLLEGE OF ENGINEERING

Gat No. 237, Pune Bangalore Highway, Dhangawadi, Tal – Bhor, Dist- Pune (Maharashtra)

### Department of Civil Engineering

#### PROGRAM SPECIFIC OUTCOMES (PSOs)

- PSO 1:** The ability to create innovative designs with new materials of minimum embodied energy through research and development focusing on global quality of life by observing professional ethics.
- PSO 2:** The ability to recognize the need of the hour like housing, sanitation, transportation, waste management, irrigation, use of renewable energy etc. for a sustainable environment.
- PSO 3:** Function effectively in multi-disciplinary teams.





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**SHRI CHHATRAPATI SHIVAJIRAJE COLLEGE OF ENGINEERING**

Gat No. 237, Satara-Pune, NH-4, Dhangawadi, Tal: Bhor, Dist: Pune

**Department of First Year Engineering**

**Course Outcomes (COs) SEM-I**

**FE - 2019 Pattern**

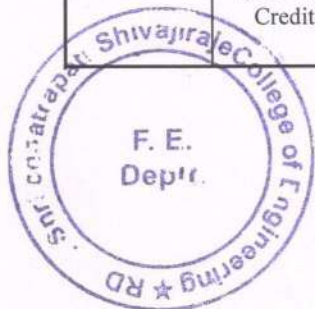
Course Code	Name of Subject/ Course	Course Outcome (COs)
107001	Engineering Mathematics – I	CO1: Mean value theorems and its generalizations leading to Taylors and Maclaurin's series useful in the analysis of engineering problems.
		CO2: the Fourier series representation and harmonic analysis for design and analysis of periodic continuous and discrete systems.
		CO3: to deal with derivative of functions of several variables that are essential in various branches of Engineering.
		CO4: to apply the concept of Jacobian to find partial derivative of implicit function and functional dependence. Use of partial derivatives in estimating error and approximation and finding extreme values of the function.
		CO5: the essential tool of matrices and linear algebra in a comprehensive manner for analysis of system of linear equations, finding linear and orthogonal transformations, Eigen values and Eigen vectors applicable to engineering problems
107002	Engineering Physics	CO1: Develop understanding of interference, diffraction and polarization; connect it to few engineering applications.
		CO2: Learn basics of lasers and optical fibers and their use in some applications.
		CO3: Understand concepts and principles in quantum mechanics. Relate them to some applications.
		CO4: Understand theory of semiconductors and their applications in some semiconductor devices.
		CO5: Summarize basics of magnetism and superconductivity. Explore few of their technological applications.
		CO6: Comprehend use of concepts of physics for Non Destructive Testing. Learn some properties of nanomaterials and their application.
102003	Systems in Mechanical Engineering	CO1: Describe and compare the conversion of energy from renewable and non-renewable energy sources
		CO2: Explain basic laws of thermodynamics, heat transfer and their applications
		CO3: List down the types of road vehicles and their specifications
		CO4: Illustrate various basic parts and transmission system of a road vehicle
		CO5: Discuss several manufacturing processes and identify the suitable process
		CO6: Explain various types of mechanism and its application

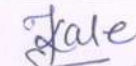


Course Code	Name of Subject/ Course	Course Outcome (COs)
103004	Basic Electrical Engineering	CO1: Differentiate between electrical and magnetic circuits and derive mathematical relation for self and mutual inductance along with coupling effect.
		CO2: Calculate series, parallel and composite capacitor as well as characteristics parameters of alternating quantity and phasor arithmetic
		CO3: Derive expression for impedance, current, power in series and parallel RLC circuit with AC supply along with phasor diagram.
		CO4: Relate phase and line electrical quantities in polyphase networks, demonstrate the operation of single phase transformer and calculate efficiency and regulation at different loading conditions
		CO5: Apply and analyze the resistive circuits using star-delta conversion KVL, KCL and different network theorems under DC supply.
		CO6: Evaluate work, power, energy relations and suggest various batteries for different applications, concept of charging and discharging and depth of charge.
110005	Programming and Problem Solving	CO1: Inculcate and apply various skills in problem solving.
		CO2: Choose most appropriate programming constructs and features to solve the problems in diversified domains.
		CO3: Exhibit the programming skills for the problems those require the writing of well- documented programs including use of the logical constructs of language, Python.
		CO4: Demonstrate significant experience with the Python program development environmen
111006	Workshop Practice	CO1: Familiar with safety norms to prevent any mishap in workshop.
		CO2: Able to handle appropriate hand tool, cutting tool and machine tools to manufacture a job.
		CO3: Able to understand the construction, working and functions of machine tools and their parts.
		CO4: Able to know simple operations (Turning and Facing) on a centre lathe.
101007	Environmental Studies-I (Mandatory Non-Credit Course)	CO1: Demonstrate an integrative approach to environmental issues with a focus on sustainability.
		CO2: Explain and identify the role of the organism in energy transfers in different ecosystems.
		CO3: Distinguish between and provide examples of renewable and nonrenewable resources & analyze personal consumption of resources.
		CO4: Identify key threats to biodiversity and develop appropriate policy options for conserving biodiversity in different settings
<b>Course Outcomes (COs) SEM-II</b>		
<b>FE - 2019 Pattern</b>		
107008	Engineering Mathematics – II	CO1: the effective mathematical tools for solutions of first order differential equations that model physical processes such as Newton's law of cooling, electrical circuit, rectilinear motion, mass spring systems, heat transfer etc.
		CO2: advanced integration techniques such as Reduction formulae, Beta functions, Gamma functions, Differentiation under integral sign and Error functions needed in evaluating multiple integrals and their applications.
		CO3: to trace the curve for a given equation and measure arc length of various curves.
		CO4: the concepts of solid geometry using equations of sphere, cone and cylinder in a comprehensive manner.
		CO5: evaluation of multiple integrals and its application to find area bounded by curves, volume bounded by surfaces, Centre of gravity and Moment of inertia.



Course Code	Name of Subject/ Course	Course Outcome (COs)
107009	Engineering Chemistry	CO1: Apply the different methodologies for analysis of water and techniques involved in softening of water as commodity.
		CO2: Select appropriate electro-technique and method of material analysis.
		CO3: Demonstrate the knowledge of advanced engineering materials for various engineering applications.
		CO4: Analyze fuel and suggest use of alternative fuels.
		CO5: Identify chemical compounds based on their structure.
		CO6: Explain causes of corrosion and methods for minimizing corrosion.
104010	Basic Electronics Engineering	CO1: Explain the working of P-N junction diode and its circuits.
		CO2: Identify types of diodes and plot their characteristics and also can compare BJT with MOSFET.
		CO3: Build and test analog circuits using OPAMP and digital circuits using universal/basic gates and flip flops.
		CO4: Use different electronics measuring instruments to measure various electrical parameters.
		CO5: Select sensors for specific applications.
		CO6: Describe basic principles of communication systems.
101011	Engineering Mechanics	CO1: Determine resultant of various force systems
		CO2: Determine centroid, moment of inertia and solve problems related to friction
		CO3: Determine reactions of beams, calculate forces in cables using principles of equilibrium
		CO4: Solve trusses, frames for finding member forces and apply principles of equilibrium to forces in space
		CO5: Calculate position, velocity and acceleration of particle using principles of kinematics
		CO6: Calculate position, velocity and acceleration of particle using principles of kinetics and Work, Power, Energy
102012	Engineering Graphics	CO1: Draw the fundamental engineering objects using basic rules and able to construct the simple geometries.
		CO2: Construct the various engineering curves using the drawing instruments.
		CO3: Apply the concept of orthographic projection of an object to draw several 2D views and its sectional views for visualizing the physical state of the object.
		CO4: Apply the visualization skill to draw a simple isometric projection from given orthographic views precisely using drawing equipment.
		CO5: Draw the development of lateral surfaces for cut section of geometrical solids.
		CO6: Draw fully-dimensioned 2D, 3D drawings using computer aided drafting tools.
110013	Project Based Learning	CO1: Project based learning will increase their capacity and learning through shared cognition.
		CO2: Students able to draw on lessons from several disciplines and apply them in practical way.
		CO3: Learning by doing approach in PBL will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.
101014	Environmental Studies-II (Mandatory Non-Credit Course)	CO1: Have an understanding of environmental pollution and the science behind those problems and potential solutions.
		CO2: Have knowledge of various acts and laws and will be able to identify the industries that are violating these rules.
		CO3: Assess the impact of ever increasing human population on the biosphere: social, economic issues and role of humans in conservation of natural resources.
		CO4: Learn skills required to research and analyze environmental issues scientifically and learn how to use those skills in applied situations such as careers that may involve environmental problems and/or issues.



  
**Head of Department**  
 First Year Engineering  
 Shri Chh. Shivajiraje College of Engg.  
 Dhangawadi, Pune-412206

Rajgad Dnyanpeeth's

SHRI CHHATRAPATI SHIVAJI RAJE COLLEGE OF ENGINEERING

S.No 237, Pune-Banglore Highway,Dhangwadi,Tal-Bhor Dist:Pune(Maharashtra)

Department of Electronics and Telecommunication

Course Outcomes (COs) SEM-I

SE (Electronics and Telecommunication) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
207005	Engineering Mathematics III	CO1: Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.
		CO2: Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.
		CO3: 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.
		CO4: Perform vector differentiation & integration, analyze the vector fields and apply to electromagnetic fields & wave theory
		CO5: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.
204181	Electronic Circuits	CO1: Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.
		CO2: Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.
		CO3: Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies
		CO4: Explain internal schematic of Op-Amp and define its performance parameters
		CO5: Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications
		CO6: Understand and compare the principles of various data conversion techniques and PLL with their applications
204182	Digital Circuits	CO1: Identify and prevent various hazards and timing problems in a digital design.
		CO2: Use the basic logic gates and various reduction techniques of digital logic circuit.
		CO3: Analyze, design and implement combinational logic circuits.
		CO4: Analyze, design and implement sequential circuits.
		CO5: Differentiate between Mealy and Moore machines.



		CO6: Analyze digital system design using PLD.
204183	Electrical Circuits	CO1: Analyze the simple DC and AC circuit with circuit simplification techniques
		CO2: Formulate and analyze driven and source free RL and RC circuits.
		CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
		CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
		CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
		CO6: Analyze and select a suitable motor for different applications.
204184	Data Structures	CO1: Solve mathematical problems using C programming language
		CO2: Implement sorting and searching algorithms and calculate their complexity.
		CO3: Develop applications of stack and queue using array.
		CO4: Demonstrate applicability of Linked List.
		CO5: Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity
		CO6: Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.

### Course Outcomes (COs) SEM-II

#### SE (Electronics and Telecommunication) -2019 Pattern

204191	Signals & Systems	CO1: Identify, classify basic signals and perform operations on signals.
		CO2: 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.
		CO3: Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.
		CO4: Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.
		CO5: Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF
		CO6: Compute the mean, mean square, variance and standard deviation for given random variables using PDF.
204192	Control Systems	CO1: Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
		CO2: Determine the (absolute) stability of a closed-loop control system.
		CO3: Perform time domain analysis of control systems required for stability analysis.
		CO4: Perform frequency domain analysis of control systems required for stability analysis.
		CO5: Apply root-locus, Frequency Plots technique to analyze control systems.
		CO6: Express and solve system equations in state variable form.
		CO7: Differentiate between various digital controllers and understand the role of the controllers in Industrial automation



204193	Principles of Communication Systems	CO1:To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.
		CO2:Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.
		CO3:Explain generation and detection of FM systems and compare with AM systems
		CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
		CO5:Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).
		CO6:Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.
204194	Object Oriented Programming	CO1:Describe the principles of object oriented programming.
		CO2:Apply the concepts of data encapsulation, inheritance in C++.
		CO3:Understand Operator overloading and friend functions in C++.
		CO4:Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.
		CO5:Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.
		CO6:Describe and use of File handling in C++.
204199	Employability Skills Development	CO1:Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.
		CO2: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.
		CO3:Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.
		CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.
		CO5: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.
204200	Project Based Learning	CO1:Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.
		CO2:Contribute to society through proposed solution by strictly following professional ethics and safety measures.
		CO3:Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
		CO4: Analyze the results and arrive at valid conclusion.
		CO5:Use of technology in proposed work and demonstrate learning in oral and written form
		CO6:Develop ability to work as an individual and as a team member.

### Course Outcomes (COs) SEM-I





## TE (Electronics and Telecommunication) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
304181	Digital Communication	CO1:Apply the statistical theory for describing various signals in a communication system.
		CO2:Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
		CO3:Describe and analyze the digital communication system with spread spectrum modulation.
		CO4: Analyze a communication system using information theoretic approach
		CO5:Use error control coding techniques to improve performance of a digital communication system.
304182	Electromagnetic Field Theory	CO1:Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.
		CO2:Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.
		CO3: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.
		CO4: Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.
		CO5: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, $V_{max}/V_{min}$ , length of transmission line using Smith Chart.
		CO6:Carry out a detailed study, interpret the relevance and applications of Electromagnetics
304183	Database Management	CO1:Ability to implement the underlying concepts of a database system.
		CO2:Design and implement a database schema for a given problem-domain using data model.
		CO3:Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.
		CO4: Implement transactions, concurrency control, and be able to do Database recovery.
		CO5:Able to understand various Parallel Database Architectures and its applications.
		CO6:Able to understand various Distributed Databases and its applications.
304184	Microcontrollers	CO1:Understand the fundamentals of microcontroller and programming.
		CO2:Interface various electronic components with microcontrollers.
		CO3:Analyze the features of PIC 18F XXXX.
		CO4: Analyze the features of PIC 18F XXXX.
		CO5:Develop interfacing models according to applications.
		CO6:Evaluate the serial communication details and interfaces
304185	Elective -I (Digital Signal Processing)	CO1:Interpret and process discrete/ digital signals and represent DSP system.
		CO2:Analyze the digital systems using the Z-transform techniques.
		CO3:Implement efficient transform and its application to analyze DT signals
		CO4: Design and implement IIR filters.
		CO5:Design and implement FIR filters



304190	Skill Development	CO6:Apply DSP techniques for speech/ biomedical/ image signal processing.
		CO1:Student should recognize the need to engage in independent and life-long learning in required skill sets
		CO2:Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.
		CO3:Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.
		CO4: Student would be able to communicate effectively at different technical and administrative levels.
		CO5:Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.

### Course Outcomes (COs) SEM-II

### TE (Electronics and Telecommunication) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
304192	Cellular Networks	CO1:Understand fundamentals of wireless communications.
		CO2:Discuss and study OFDM and MIMO concepts.
		CO3:Elaborate fundamentals mobile communication.
		CO4: Describes aspects of wireless system planning.
		CO5:Understand of modern and futuristic wireless networks architecture.
		CO6:Summarize different issues in performance analysis.
304193	Project Management	CO1:Apply the fundamental knowledge of project management for effectively handling the projects
		CO2:Identify and select the appropriate project based on feasibility study and undertake its effective planning.
		CO3:Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
		CO4: Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
		CO5:Identify and assess the project risks and manage finances in line with Project Financial Management Process.
		CO6: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.
304194	Power Devices & Circuits	CO1:To 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
		CO2:To design triggering / driver circuits for various power devices
		CO3:To evaluate and analyze various performance parameters of the different converters and its topologies
		CO4: To understand significance and design of various protections circuits for power devices
		CO5:To evaluate the performance of uninterruptible power supplies, inverter, switch mode power supplies and battery
		CO6:To understand case studies of power electronics in applications like electric vehicles, solar systems etc.
		CO1:Apply knowledge of mathematics for image understanding and analysis.
		CO2:Implement spatial domain image operations.



304195	Elective-II (Digital Image Processing)	CO3: Design and realize various algorithms for image segmentation.
		CO4: Design and realize various algorithms for image Compression
		CO5: Apply restoration to remove noise in the image.
		CO6: Describe the object recognition system.
304200	Mini Project	CO1: Understand, plan and execute a Mini Project with team.
		CO2: Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
		CO3: Prepare a technical report based on the Mini project.
		CO4: Deliver technical seminar based on the Mini Project work carried out.

### Course Outcomes (COs) SEM-I

### BE (Electronics and Telecommunication) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
404181	VLSI Design & Technology	CO1: Write effective HDL coding for digital design.
		CO2: Apply knowledge of real time issues in digital design.
		CO3: Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
		CO4: Design CMOS circuits for specified applications.
		CO5: Analyze various issues and constraints in design of an ASIC
		CO6: Apply knowledge of testability in design and build self test circuit.
404182	Computer Networks & Security	CO1: Understand fundamental underlying principles of computer networking
		CO2: Describe and analyze the hardware, software, components of a network and their interrelations.
		CO3: Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
		CO4: Have a basic knowledge of installing and configuring networking applications
		CO5: Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
		CO6: Have a basic knowledge of the use of cryptography and network security.
404183	Radiation & Microwave Techniques	CO1: Differentiate various performance parameters of radiating elements.
		CO2: Analyze various radiating elements and arrays.
		CO3: Apply the knowledge of waveguide fundamentals in design of transmission lines.
		CO3: Design and set up a system consisting of various passive microwave components.
		CO4: Analyze tube based and solid state active devices along with their applications.
		CO5: Measure various performance parameters of microwave components.
404184	Elective I IOT	CO1: Understand the various concepts, terminologies and architecture of IoT systems
		CO2: Use sensors and actuators for design of IoT.
		CO3: Understand and apply various protocols for design of IoT systems
		CO4: Use various techniques of data storage and analytics in IoT
		CO5: Understand various applications of IoT

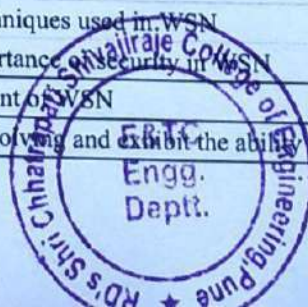


404185	Elective II EDP	CO1: Understand various stages of hardware, software and PCB design.
		CO2: Importance of product test & test specifications.
		CO3: Special design considerations and importance of documentation.
404188	Project Stage I	CO1: identify an engineering problem, devise a means of solving and exhibit the ability to execute the solution.
		CO2: Develop confidence for self-education and ability for lifelong learning
Audit Course 5 Green Energy		CO1: List and generally explain the main sources of energy and their primary applications in the India, and the world.
		CO2: Describe the challenges and problems associated with the use of various energy sources, including fossil fuels, with regard to future supply and the environment.
		CO3: Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources.
		CO4: List and describe the primary renewable energy resources and technologies.
		CO5: Describe/illustrate basic electrical concepts and system components
		CO6: Convert units of energy to quantify energy demands and make comparisons among energy uses, resources, and technologies.
		CO7: Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.

### Course Outcomes (COs) SEM-II

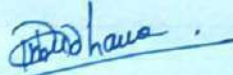
### BE (Electronics and Telecommunication) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
404189	Mobile Communication	CO1: Apply the concepts of switching technique and traffic engineering to design multistage networks.
		CO2: Explore the architecture of GSM.
		CO3: Differentiate thoroughly the generations of mobile technologies.
404190	Broadband Communication Systems	CO1: Perform Link power budget and Rise Time Budget by proper selection of components and check its viability
		CO2: Perform Satellite Link design for Up Link and Down Link
404191	Elective III Audio video Engineering	CO1: Apply the fundamentals of Analog Television and Colour Television standards.
		CO2: Explain the fundamentals of Digital Television, DTV standards and parameters.
		CO3: Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems.
		CO4: Understand acoustic fundamentals and various acoustic systems.
404192	Elective IV Wireless Sensor Networks	CO1: Explain various concepts and terminologies used in WSN
		CO2: Describe importance and use of radio communication and link management in WSN
		CO3: Describe importance and use of radio communication and link management in WSN
		CO4: Explain various wireless standards and protocols associated with WSN
		CO5: Recognise importance of localisation and routing techniques used in WSN
		CO6: Understand techniques of data aggregation and importance of security in WSN
		CO7: Examine the issues involved in design and deployment of WSN
		CO1: identify an engineering problem, devise a means of solving and exhibit the ability to execute the solution.



404195	Project Stage II	CO2: demonstrate knowledge of professional and ethical responsibilities.
		CO3: show the understanding of impact of engineering solutions on the society and also will be aware of contemporary issues
		CO4: communicate effectively in both verbal and written form
		CO5: develop confidence for self-education and ability for lifelong learning
	Audit Course 6 Environment and Disaster Management	CO1: To learn the different environmental issues and disasters.
		CO2: To deal with problems associated with environment and effectively handle the disasters.



  
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**Department of Mechanical Engineering**  
**Course Outcomes (COs) SEM-I**  
**SE (Mechanical Engineering) -2019 Pattern**

Course Code	Name of Subject/ Course	Course Outcome (COs)
202041	Solid Mechanics	CO1-Define various types of stresses and strain Developed on determinate and indeterminate members.
		CO2-Draw Shear force and bending moment diagram for various types of transverse loading and support.
		CO3- Compute the slope & deflection, bending stresses and shear stresses on a beam.
		CO4- Calculate torsional shear stress in shaft and buckling on the column.
		CO5- Apply the concept of principal stresses and theories of failure to Determine stresses on a 2-D element.
		CO6- Utilize the concepts of SFD & BMD, torsion and principal stresses to Solve combined loading application based problems.
202042	Solid Modeling and Drafting	CO1 - Understand basic concepts of CAD system, need and scope in Product Lifecycle Management.
		CO2 - Utilize knowledge of curves and surfacing features and methods to create complex solid geometry.
		CO3 - Construct solid models, assemblies using various modeling techniques & Perform mass property analysis, including creating and using a coordinate system.
		CO4 - Apply geometric transformations to simple 2D geometries.
		CO5 - Use CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
		CO6 - Use PMI & MBD approach for communication
202043	Engineering Thermodynamics	CO1 - Describe the basics of thermodynamics with heat and work interactions.
		CO2 - Apply laws of thermodynamics to steady flow and non-flow processes.
		CO3 - Apply entropy, available and non available energy for an Open and Closed System.
		CO4 - Determine the properties of steam and their effect on Performance of vapour power cycle.
		CO5 - Analyse the fuel combustion process and products of combustion.
		CO6 - Select various instrumentations required for safe and efficient operation of steam generator.
		CO1 - Compare crystal structures and ASSESS different lattice parameters.



202044	Engineering Materials and Metallurgy	CO2 - Correlate crystal structures and imperfections in crystals with mechanical behaviour of materials.
		CO3 - Differentiate and Determine mechanical properties using destructive and nondestructive testing of materials.
		CO4 - Identify & Estimate different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
		CO5 - Analyse effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
		CO6 - Select appropriate materials for various applications.
203156	Electrical and Electronics Engineering	CO1 - Apply programming concepts to Understand role of Microprocessor and Microcontroller in embedded systems.
		CO2 - Develop interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board.
		CO3 - Understand the operation of DC motor, its speed control methods and braking.
		CO4 - Distinguish between types of three phase induction motor and its characteristic features.
		CO5 - Explain about emerging technology of Electric Vehicle (EV) and its modular subsystems.
		CO6 - Choose energy storage devices and electrical drives for Evs.
202045	Geometric Dimensioning and Tolerancing Lab	CO1 - Select appropriate IS and ASME standards for drawing.
		CO2 - Read & Analyse variety of industrial drawings.
		CO3 - Apply geometric and dimensional tolerance, surface finish symbols in drawing.
		CO4 - Evaluate dimensional tolerance based on type of fit, etc.
		CO5 - Select an appropriate manufacturing process using DFM, DFA, etc.

**Course Outcomes (COs) SEM-II**  
**SE (Mechanical Engineering) -2019 Pattern**

Course Code	Name of Subject/ Course	Course Outcome (COs)
207002	Engineering Mathematics - III	CO1 - Solve higher order linear differential equations and its applications to model and Analyze mass spring systems.
		CO2 - 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.
		CO3 - Apply Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.
		CO4 - Perform Vector differentiation & integration, Analyze the vector fields and Apply to fluid flow problems.
		CO5 - Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.
	Kinematics of	CO1 - Apply kinematic analysis to simple mechanisms.
		CO2 - Analyze velocity and acceleration in mechanisms by vector and graphical method.



202047	Kinematics of Machinery	CO3 - Synthesize a four bar mechanism with analytical and graphical methods.
		CO4 - Apply fundamentals of gear theory as a prerequisite for gear design.
		CO5 - Construct cam profile for given follower motion.
202048	Applied Thermodynamics	CO1 - Determine COP of refrigeration system and Analyze psychrometric processes.
		CO2 - Discuss basics of engine terminology, air standard, fuel air and actual cycles.
		CO3 - Identify factors affecting the combustion Performance of SI and CI engines.
		CO4 - Determine Performance parameters of IC Engines and emission control.
		CO5 - Explain working of various IC Engine systems and Use of alternative fuels.
		CO6 - Calculate Performance of single and multi stag.
202049	Fluid Mechanics	CO1 - Determine various properties of fluid.
		CO2 - Apply the laws of fluid statics and concepts of buoyancy.
		CO3 - Identify types of fluid flow and terms associated in fluid kinematics.
		CO4 - Apply principles of fluid dynamics to laminar flow.
		CO5 - Estimate friction and minor losses in internal flows and Determine boundary layer formation over an external surface.
		CO6 - Construct mathematical correlation considering dimensionless parameters, also ABLE to predict the Performance of prototype using model laws.
202050	Manufacturing Processes	CO1 - Select appropriate moulding, core making and melting practice and Estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process.
		CO2 - Understand mechanism of metal forming techniques and Calculate load required for flat rolling.
		CO3 - Demonstrate press working operations and Apply the basic principles to DESIGN dies and tools for forming and shearing operations.
		CO4 - Classify and Explain different welding processes and Evaluate welding characteristics.
		CO5 - Differentiate thermoplastics and thermosetting and Explain polymer processing techniques.
		CO6 - Understand the principle of manufacturing of fibre-reinforce composites and metal matrix composites.
202051	Machine Shop	CO1 - Perform welding using TIG/ MIG/ Resistance/Gas welding technique
		CO2 - Make Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques.
		CO3 - Perform cylindrical/surface grinding operation and Calculate its machining time.
		CO4 - Determine number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine.
		CO5 - Prepare industry visit report.
		CO6 - Understand procedure of plastic processing.
		CO1 - Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
		CO2 - Analyze the results and arrive at valid conclusions.



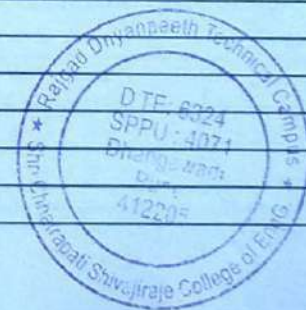


202052	Project Based Learning - II	CO3 - Propose a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
		CO4 - Contribute to society through Proposed solutions by strictly following professional ethics and safety measures.
		CO5 - Use of technology in Proposed work and Demonstrate learning in oral and written form.
		CO6 - Develop ability to work as an individual and as a team member.

### Course Outcomes (COs) SEM-I

### TE (Mechanical Engineering) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
302041	Numerical and Statistical Methods	CO1: SOLVE system of equations using direct and iterative numerical methods.
		CO2: ESTIMATE solutions for differential equations using numerical techniques.
		CO3: DEVELOP solution for engineering applications with numerical integration.
		CO4: DESIGN and CREATE a model using a curve fitting and regression analysis.
		CO5: APPLY statistical Technique for quantitative data analysis.
		CO6: DEMONSTRATE the data, using the concepts of probability and linear algebra.
302042	Heat and Mass Transfer	CO1. ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
		CO2. DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
		CO3. EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results.
		CO4. INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.
		CO5. ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
		CO6. DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance.
302043	Design of Machine Elements	CO1. DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.
		CO2. DESIGN shafts, keys and couplings under static loading conditions.
		CO3. ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
		CO4. EVALUATE dimensions of machine components under fluctuating loads.
		CO5. EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
		CO6. APPLY the design and development procedure for different types of springs.
302044	Mechatronics	CO1. DEFINE key elements of mechatronics, principle of sensor and its characteristics.
		CO2. UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
		CO3. DETERMINE the transfer function by using block diagram reduction technique.
		CO4. EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system.
		CO5. APPLY the concept of different controller modes to an industrial application.
		CO6. DEVELOP the ladder programming for industrial application.
302045-R	Machining Science	CO1. DEFINE metal cutting principles and mechanics of metal cutting and tool life.
		CO2. DESCRIBE features of gear and thread manufacturing processes.
		CO3. SELECT appropriate grinding wheel and demonstrate the various surface finishing processes.



CO4. SELECT appropriate jigs/fixtures and to draw the process plan for a given component. CO5. SELECT & EVALUATE various parameters of process planning.  
CO5. SELECT & EVALUATE various parameters of process planning.  
CO6. GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software.

### Course Outcomes (COs) SEM-II

### TE (Mechanical Engineering) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
302049	Artificial Intelligence & Machine Learning	CO1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.
		CO2. APPLY feature extraction and selection techniques.
		CO3. APPLY machine learning algorithms for classification and regression problems.
		CO4. DEVISE AND DEVELOP a machine learning model using various steps.
		CO5. EXPLAIN concepts of reinforced and deep learning.
		CO6. SIMULATE machine learning model in mechanical engineering problems.
302050	Computer Aided Engineering	CO1: DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
		CO2: APPLY the various meshing techniques for better evaluation of approximate results.
		CO3: APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
		CO4: ANALYZE and APPLY various numerical methods for different types of analysis.
		CO5: EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
		CO6: GENERATE the results in the form of contour plot by the USE of CAE tools.
302051	Design of Transmission Systems	CO1. APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
		CO2. EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.
		CO3. SELECT & DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.
		CO4. DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.
		CO5. APPLY various concept to DESIGN Machine Tool Gear box, for different applications
		CO6. ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.
302052-A	Composite Materials	CO1. DEFINE & COMPARE composites with traditional materials.
		CO2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
		CO3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
		CO4. DETERMINE volume/weight fraction and strength of Composites.
		CO5. SELECT appropriate testing and inspection method for composite materials. CO6. SELECT composites materials for various applications.
<b>Course Outcomes (COs) SEM-I</b>		
<b>BE (Mechanical Engineering) -2015 Pattern</b>		
Course Code	Name of Subject/ Course	Course Outcome (COs)



402041	Hydraulics and Pneumatics	CO1 -Understand working principle of components Used in hydraulic & pneumatic systems
		CO2 - Identify various applications of hydraulic & pneumatic systems
		CO3 - Selection of appropriate components required for hydraulic and pneumatic systems
		CO4 -Analyse hydraulic and pneumatic systems for industrial/mobile applications
		CO5 - Design a system according to the requirements
		CO6- Develop and Apply knowledge to various applications
402042	CAD CAM Automation	CO1 - Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations.
		CO2 - Use analytical and synthetic curves and surfaces in part modeling
		CO3 - Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software
		CO4 -Generate CNC program for Turning / Milling and generate tool path using CAM software
		CO5 - Demonstrate Understanding of various rapid manufacturing techniques and Develop competency in designing and Developing products using rapid manufacturing technology
		CO6 -Understand the robot systems and their applications in manufacturing industries.
402043	Dynamics of Machinery	CO1 - Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines
		CO2 - Estimate natural frequency for single DOF undamped & damped free vibratory systems
		CO3 -Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
		CO4- Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
		CO5 -Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
		CO6- Explain noise, its measurement & noise reduction techniques for industry and day today life problems.
402044 A	Elective-I Finite Element Analysis	CO1 - Understand the different techniques Used to Solve mechanical engineering problems.
		CO2 - Derive and Use 1-D and 2-D element stiffness matrices and load vectors from various methods to Solve for displacements and stresses.
		CO3 - Apply mechanics of materials and machine design topics to provide preliminary results Used for testing the reasonableness of finite element results.
		CO4 - Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
		CO5 - Use commercial finite element analysis software to Solve complex problems in solid mechanics and heat transfer.
		CO6 - Interpret the results of finite element Analyses and Make an assessment of the results in terms of modeling (physics assumptions) errors, discretization (mesh density and refinement toward convergence) errors, and numerical (round-off) errors.
402044 C	Elective-I Heating Ventilation and Air Conditioning	CO1 - Determine the Performance parameters of trans-critical & ejector refrigeration systems
		CO2 - Estimate thermal Performance of compressor, evaporator, condenser and cooling tower
		CO3 - Describe refrigerant piping design, capacity & safety controls and balancing of vapour compressor system.
		CO4 - Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
		CO5 - Estimate heat transmission through building walls using CLTD and decrement factor & time lag methods with energy-efficient and cost-effective measures for building envelope
		CO6 -Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean room and heat pump air-conditioning systems.
402045 A	Elective-II Automobile Engineering	CO1 - To Compare and Select the proper automotive system for the vehicle.
		CO2 - To Analyse the Performance of the vehicle.
		CO3 - To diagnose the faults of automobile vehicles.
		CO4 - To Apply the knowledge of EVs, HEVs and solar vehicles.


### Course Outcomes (COs) SEM-II



## BE (Mechanical Engineering) -2015 Pattern

402047	Energy Engineering	CO1-Describe the power generation scenario, the layout components of thermal power plant and Analyze the improved Rankin cycle, Cogeneration cycle
		CO2 - Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
		CO3 -Recognize the layout, component details of hydroelectric power plant and nuclear power plant
		CO4 -Realize the details of diesel power plant, gas power plant and Analyze gas turbine power cycle
		CO5 -Emphasize the fundamentals of non-conventional power plants
		CO6 -Describe the different power plant electrical instruments and basic principles of economics of power generation.
402048	Mechanical System Design	CO1-Understand the difference between component level design and system level design.
		CO2 - Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
		CO3 -Learn optimum design principles and Apply it to mechanical components.
		CO4 -Handle system level projects from concept to product.
402049 B	Elective-III Industrial Engineering	CO1-Applly the Industrial Engineering concept
		CO2 - Understand, Analyze and implement different concepts involved in method study.
		CO3 -Design and Develop different aspects of work system and facilities.
		CO4 -Understand and Apply Industrial safety standards, financial management practices.
		CO5 - Undertake project work based on modeling & simulation area.
402050 A	Elective-IV Advanced Manufacturing Processes	CO1- Classify and Analyze special forming processes
		CO2 -Analyze and Identify applicability of advanced joining processes
		CO3 - Understand and Analyze the basic mechanisms of hybrid non-conventional machining techniques
		CO4 -Select appropriate micro and nano fabrication techniques for engineering applications
		CO5 -Understand and Apply various additive manufacturing technology for product Development
		CO6 - Understand material characterization techniques to Analyze effects of chemical composition, composition variation, crystal structure, etc.



  
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## Department of Computer Engineering

## Course Outcomes (COs) SEM-I

## SE (Computer Engineering) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
210241	Discrete Mathematics	CO1: Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
		CO2: Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
		CO3: Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
		CO4: Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.
		CO5: Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.
		CO6: Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.
		CO7: Analyze the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures.
210242	Fundamentals of Data Structures	CO1: Design the algorithms to solve the programming problems, identify appropriate algorithmic strategy for specific application, and analyze the time and space complexity.
		CO2: Discriminate the usage of various structures, Design/Program/Implement the appropriate data structures; use them in implementations of abstract data types and Identify the appropriate data structure in approaching the problem solution.
		CO3: Demonstrate use of sequential data structures- Array and Linked lists to store and process data.
		CO4: Understand the computational efficiency of the principal algorithms for searching and sorting and choose the most efficient one for the application
		CO5: Compare and contrast different implementations of data structures (dynamic and static).
		CO6: Understand, Implement and apply principles of data structures-stack and queue to solve computational problems.
210243	Object Oriented Programming(OOP)	CO1: Apply constructs- sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software
		CO2: Design object-oriented solutions for small systems involving multiple objects.
		CO3: Use virtual and pure virtual function and complex programming situations.
		CO4: Apply object-oriented software principles in problem solving.
		CO5: Analyze the strengths of object-oriented programming.
		CO6: Develop the application using object oriented programming language(C++).
210244	Computer Graphics	CO1: Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.
		CO2: Apply mathematics to develop Computer programs for elementary graphic operations.
		CO3: Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
		CO4: Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.

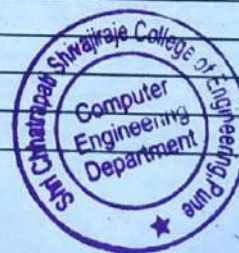


		CO5: Understand the concepts of color models, lighting, shading models and hidden surface elimination.
		CO6: Create effective programs using concepts of curves, fractals, animation and gaming.
210245	Digital Electronics and Logic Design	CO1: Simplify Boolean Expressions using K Map.
		CO2: Design and implement combinational circuits.
		CO3: Design and implement sequential circuits.
		CO4: Develop simple real-world application using ASM and PLD.
		CO5: Differentiate and Choose appropriate logic families IC packages as per the given design specifications.
		CO6: Explain organization and architecture of computer system

### Course Outcomes (COs) SEM-II

#### SE (Computer Engineering) -2019 Pattern

207003	Engineering Mathematics III	CO1: Solve Linear differential equations, essential in modelling and design of computer-based systems.
		CO2: Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
		CO3: Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.
		CO4: Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.
		CO5: Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.
210252	Data Structures and Algorithms	CO1: Identify and articulate the complexity goals and benefits of a good hashing scheme for realworld applications.
		CO2: Apply non-linear data structures for solving problems of various domain.
		CO3: Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.
		CO4: Analyze the algorithmic solutions for resource requirements and optimization
		CO5: Use efficient indexing methods and multiway search techniques to store and maintain data
		CO6: Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.
210253	Software Engineering	CO1: Analyze software requirements and formulate design solution for a software.
		CO2: Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
		CO3: 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.
		CO4: Model and design User interface and component-level.
		CO5: Identify and handle risk management and software configuration management
		CO7: Construct software of high quality – software that is reliable, and that is reasonably easy to understand, modify and maintain efficient, reliable, robust and cost-effective software solutions.
210254	Microprocess or	CO1: Exhibit skill of assembly language programming for the application.
		CO2: Classify Processor architectures.
		CO3: Illustrate advanced features of 80386 Microprocessor.
		CO4: Compare and contrast different processor modes.
		CO5: Use interrupts mechanism in applications
		CO6: Differentiate between Microprocessors and Microcontrollers.



		CO7: Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.
210255	Principles of Programming Languages	CO1: Make use of basic principles of programming languages.
		CO2: Develop a program with Data representation and Computations.
		CO3: Develop programs using Object Oriented Programming language : Java.
		CO4: Develop application using inheritance, encapsulation, and polymorphism.
		CO5: Demonstrate Multithreading for robust application development.
		CO6: Develop a simple program using basic concepts of Functional and Logical programming paradigm

### Course Outcomes (COs) SEM-I

### TE (Computer Engineering) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
310241	Database Management System	CO1: Analyze and design Database Management System using ER model
		CO2: Implement database queries using database languages
		CO3: Normalize the database design using normal forms
		CO4: Apply Transaction Management concepts in real-time situations
		CO5: Use NoSQL databases for processing unstructured data
		CO6: Differentiate between Complex Data Types and analyze the use of appropriate data types
310242	Theory of Computation	CO1: Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants
		CO2: Construct regular expression to present regular language and understand pumping lemma for RE
		CO3: Design Context Free Grammars and learn to simplify the grammar
		CO4: Construct Pushdown Automaton model for the Context Free Language
		CO5: Design Turing Machine for the different requirements outlined by theoretical computer science
		CO6: Analyze different classes of problems, classify and analyze them and study concepts of NP completeness
310243	Systems Programming and Operating System	CO1: Analyze and synthesize basic System Software and its functionality.
		CO2: Identify suitable data structures and Design & Implement various System Software
		CO3: Compare different loading schemes and analyze the performance of linker and loader
		CO4: Implement and Analyze the performance of process scheduling algorithms
		CO5: Identify the mechanism to deal with deadlock and concurrency issues
		CO6: Demonstrate memory organization and memory management policies
310244	Computer Networks and Security	CO1: Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
		CO2: Illustrate the working and functions of data link layer
		CO3: Analyze the working of different routing protocols and mechanisms
		CO4: Implement client-server applications using sockets



		CO5: Illustrate role of application layer with its protocols, client-server architectures
		CO6: Comprehend the basics of Network Security
310245(A)	Internet of Things and Embedded Systems	CO1: Understand the fundamentals and need of Embedded Systems for the Internet of Things
		CO2: Apply IoT enabling technologies for developing IoT systems
		CO3: Apply design methodology for designing and implementing IoT applications
		CO4: Analyze IoT protocols for making IoT devices communication
		CO5: Design cloud based IoT systems
		CO6: Design and Develop secured IoT applications

**Course Outcomes (COs) SEM-II  
TE (Computer Engineering) -2019 Pattern**

310251	Data Science and Big Data Analytics	CO1: Analyze needs and challenges for Data Science Big Data Analytics
		CO2: Apply statistics for Big Data Analytics
		CO3: Apply the lifecycle of Big Data analytics to real world problems
		CO4: Implement Big Data Analytics using Python programming
		CO5: Implement data visualization using visualization tools in Python programming
		CO6: Design and implement Big Databases using the Hadoop ecosystem
310252	Web Technology	CO1: Implement and analyze behavior of web pages using HTML and CSS
		CO2: Apply the client side technologies for web development
		CO3: Analyze the concepts of Servlet and JSP
		CO4: Analyze the Web services and frameworks
		CO5: Apply the server side technologies for web development
		CO6: Create the effective web applications for business functionalities using latest webdevelopment platforms
310253	Artificial Intelligence	CO1: Identify and apply suitable Intelligent agents for various AI applications
		CO2: Build smart system using different informed search / uninformed search or heuristic approaches
		CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
		CO4: Apply the suitable algorithms to solve AI problems
		CO5: Implement ideas underlying modern logical inference systems
		CO6: Represent complex problems with expressive yet carefully constrained language of representation
310254(A)	Information Security	CO1: Model the cyber security threats and apply formal procedures to defend the attacks
		CO2: Apply appropriate cryptographic techniques by learning symmetric and asymmetric key cryptography
		CO3: Design and analyze web security solutions by deploying various cryptographic techniques along with data integrity algorithms
		CO4: Identify and Evaluate Information Security threats and vulnerabilities in Information systems and apply security measures to real time scenarios
		CO5: Demonstrate the use of standards and cyber laws to enhance Information Security in the development process and infrastructure protection

**Course Outcomes (COs) SEM-I  
BE (Computer Engineering) -2015 Pattern**





Course Code	Name of Subject/ Course	Course Outcome (COs)
410241	High Performance Computing	CO1: Describe different parallel architectures, inter-connect networks, programming models
		CO2: Develop an efficient parallel algorithm to solve given problem
		CO3: Analyze and measure performance of modern parallel computing systems
		CO4: Build the logic to parallelize the programming task
410242	Artificial Intelligence and Robotics	CO1: Identify and apply suitable Intelligent agents for various AI applications
		CO2: Design smart system using different informed search / uninformed search or heuristic approaches.
		CO3: Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
		CO4: Apply the suitable algorithms to solve AI problems
410243	Data Analytics	CO1: Write case studies in Business Analytic and Intelligence using mathematical models
		CO2: Present a survey on applications for Business Analytic and Intelligence
		CO3: Provide problem solutions for multi-core or distributed, concurrent/Parallel environments
410244(D)	Data Mining and Warehousing	CO1: Apply basic, intermediate and advanced techniques to mine the data
		CO2: Analyze the output generated by the process of data mining
		CO3: Explore the hidden patterns in the data
		CO4: Optimize the mining process by choosing best data mining technique
410245(B)	Software Testing and Quality Assurance	CO1: Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
		CO2: Design and develop project test plan, design test cases, test data, and conduct test operations
		CO3: Apply recent automation tool for various software testing for testing software
		CO4: Apply different approaches of quality management, assurance, and quality standard to software system
		CO5: Apply and analyze effectiveness Software Quality Tools

### Course Outcomes (COs) SEM-II


### BE (Computer Engineering) -2015 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
410250	Machine Learning	CO1: Distinguish different learning based applications
		CO2: Apply different preprocessing methods to prepare training data set for machine learning.
		CO3: Design and implement supervised and unsupervised machine learning algorithm.
		CO4: Implement different learning models
		CO5: Learn Meta classifiers and deep learning concepts
410251	Information and Cyber Security	CO1: Gauge the security protections and limitations provided by today's technology.
		CO2: Identify information security and cyber security threats.
		CO3: Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
		CO4: Build appropriate security solutions against cyber-attacks.
	Embedded and Real-time Systems	CO1: Recognize and classify embedded and real-time systems
		CO2: Explain communication bus protocols used for embedded and real-time systems



410252(C)	Real Time Operating System	CO3: Classify and exemplify scheduling algorithms
		CO4: Apply software development process to a given RTOS application
		CO5: Design a given RTOS based application
410253(C)	Cloud Computing	CO1: To install cloud computing environments.
		CO2: To develop any one type of cloud
		CO3: To explore future trends of cloud computing



  
**Head of Department**  
**Dept. Computer Engineering**  
**Shri Chh. Shivajiraje College of Engg.**  
**Dhargawadi, Pune-412206**

D. Civil Department

Rajgad Dnyanpeeth's

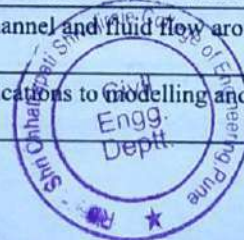
SHRI CHHATRAPATI SHIVAJI RAJE COLLEGE OF ENGINEERING  
S.No 237, Pune-Bangalore Highway,Dhangwadi,Tal-Bhor Dist:Pune(Maharashtra)

Department of Civil Engineering

Course Outcomes (COs) SEM-I

SE (Civil Engineering ) -2019 Pattern

Course Code	Name of Subject/ Course	Course Outcome (COs)
201001	Building Technology & Materials	CO1 - Identify types of building and basic requirements of building components.
		CO2 -Make use of Architectural Principles and Building byelaws for building construction.
		CO3 - Plan effectively various types of Residential Building forms according to their utility,functions with reference to National Building Code.
		CO4 - Plan effectively various types of Public Buildings according to their utility functions withreference to National Building Code.
		CO5 -Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects
		CO6 - Understand different services and safety aspects
201002	Mechanics of structure	CO1 -Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.
		CO2 -Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.
		CO3 - Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
		CO4 -Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
		CO5 -Analyze axially loaded and eccentrically loaded column.
		CO6 - Determine the slopes and deflection of determinate beams and trusses.
201003	Fluid Mechanics	CO1 -Understand the use of Fluid Properties, concept of Fluid statics, basic equation of Hydrostatics, measurement of fluid pressure, buoyancy & floatation and its application for solving practical problems.
		CO2 -Understand the concept of fluid kinematics with reference to Continuity equation and fluid dynamics with reference to Modified Bernoulli's equation and its application to practical problems of fluid flow
		CO3 -Understand the concept of Dimensional analysis using Buckingham's $\pi$ theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow.
		CO4 -Understand the concept of laminar and turbulent flow and flow through pipes and its application to determine major and minor losses and analyze pipe network using Hardy Cross method.
		CO5 - Understand the concept of open channel flow, uniform flow and depth-Energy relationships in open channel flow and make the use of Chezy's and Manning's formulae for uniform flow computation and design of most economical channel section.
		CO6 - Understand the concept of gradually varied flow in open channel and fluid flow around submerged objects, compute GVF profile and calculate drag and lift force on fully submergedbody.
		CO1 -Solve Higher order linear differential equations and its applications to modelling and analysing Civil engineering problems such as bending of beams, whirling of shafts and mass spring systems.



207001	Engineering Mathematics III	CO2 - Solve System of linear equations using direct & iterative numerical techniques and develop solutions for ordinary differential equations using single step & multistep methods applied to hydraulics, geotechnics and structural systems.
		CO3 - Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
		CO4 - Perform Vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.
		CO5 - Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.
207009	Engineering Geology	CO1 - Explain about the basic concepts of engineering geology, various rocks, and minerals both in lab and on the fields and their inherent characteristics and their uses in civil engineering constructions.
		CO2 - Exploring the importance of mass wasting processes and various tectonic processes that hampers the design of civil engineering projects and its implications on environment and sustainability.
		CO3 - Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.
		CO4 - Incorporate the various methods of survey, to evaluate and interpret geological nature of the rocks present at the foundations of the dams, percolation tanks, tunnels and to infer site / alignment/ level free from geological defects.
		CO5 - Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
		CO6 - Explain geological hazards and importance of ground water and uses of common building stones.
201007	Awareness to civil Engineering Practices	CO1 - Describe functioning/working of different types of industries/sectors in Civil Engineering.
		CO2 - Describe drawings and documents required and used in different Civil Engineering works.
		CO3 - Understand the importance of Code of Ethics to be practiced by a Civil Engineer and also understand the duties and responsibilities as a Civil Engineer.
		CO4 - Understand different health and safety practices on the site.

### Course Outcomes (COs) SEM-II

### SE (Civil Engineering) -2019 Pattern

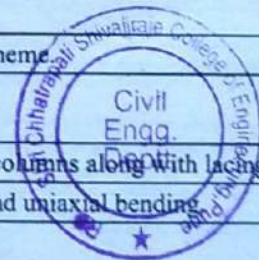
201008	Geotechnical Engineering	CO1 - Identify and classify the soil based on the index properties and its formation process
		CO2 - Explain permeability and seepage analysis of soil by construction of flow net.
		CO3 - Illustrate the effect of compaction on soil and understand the basics of stress distribution.
		CO4 - Express shear strength of soil and its measurement under various drainage conditions.
		CO5 - Evaluate the earth pressure due to backfill on retaining structures by using different theories.
		CO6 - Analysis of stability of slopes for different types of soils.
201009	Survey	CO1-Define and Explain basics of plane surveying and differentiate the instruments used for it.
		CO2-Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.
		CO3-Describe different methods of surveying and find relative positions of points on the surface of earth.
		CO4-Execute curve setting for civil engineering projects such as roads, railways etc
		CO5-Articulate advancements in surveying such as space based positioning systems
		CO6-Differentiate map and aerial photographs, also interpret aerial photographs
201010	Concrete Technology	CO1 - Able to select the various ingredients of concrete and its suitable proportion to achieved desired strength.
		CO2 -Able to check the properties of concrete in fresh and hardened state.
		CO3 - Get acquainted to concreting equipments, techniques and different types of special concrete.
		CO4 - Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques.



201011	Structural Analysis	CO1 - Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
		CO2 - Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
		CO3 - Implement application of the slope deflection method to beams and portal frames
		CO4 - Analyze beams and portal frames using moment distribution method.
		CO5 - Determine response of beams and portal frames using structure approach of stiffness matrix method.
		CO6 - Apply the concepts of plastic analysis in the analysis of steel structures
201012	Project management	CO1 - Describe project life cycle and the domains of Project Management.
		CO2 - Explain networking methods and their applications in planning and management
		CO3 - Categorize the materials as per their annual usage and also Calculate production rate of construction equipment
		CO4 - Understand economical terms and different laws associated with project management
		CO5 - Understand economical terms and different laws associated with project management
		CO6 - Apply the methods of project selection and recommend the best economical project
201017	Project Based Learning	CO1 - Identify the community/ practical/ societal needs and convert the idea into a product/ process/service
		CO2 - Analyse and design the physical/ mathematical/ ICT model in order to solve identified problem/project.
		CO3 - Create, work in team and applying the solution in practical way to specific problem.

**Course Outcomes (COs) SEM-I  
TE (Civil Engineering) -2019 Pattern**

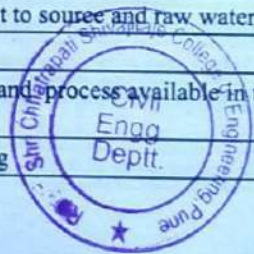
Course Code	Name of Subject/ Course	Course Outcome (COs)
301001	Hydrology and Water Resources Engineering	CO1-Understand government organizations, apply & analyze precipitation & its abstractions.
		CO2-Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
		CO3-Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
		CO4-"Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics."
		CO5-"Understand water logging & water management, apply & analyze ground water hydrology"
		CO6-"Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement."
301002	Water Supply Engineering	CO1- Define identify, describe reliability of water sources, estimate water requirement for various sectors
		CO2 -Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
		CO3 - Design various components of water treatment plant and distribution system.
		CO4 -Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
		CO5 - Design elevated service reservoir capacity and understand the rainwater harvesting
		CO6- Understand the requirement of water treatment plant for infrastructure and Government scheme.
301003	Design of Steel Structures	CO1 - Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
		CO2 - Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
		CO3 - Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending



	Structures	CO4 - Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
		CO5 - Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.
		CO6-Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.
301004	Engineering Economics and Financial Management	CO1 - Understand basics of construction economics
		CO2 - Develop an understanding of financial management in civil engineering projects.
		CO3 - Prepare and analyze the contract account.
		CO4 - Decide on right source of fund for construction projects.
		CO5 - Understand working capital and its estimation for civil engineering projects.
		CO6- Illustrate the importance of tax planning & understand role of financial regulatory bodies
301005	Elective I	CO1 - Understand the overview of construction sector.
		CO2 - Illustrate construction scheduling, work study and work measurement.
		CO3 - Acquaint various labour laws and financial aspects on construction projects.
		CO4 - Explain elements of risk management techniques in construction.
		CO5 - State material and human resource management techniques in construction.
		CO6-Understand basics of artificial intelligence techniques in civil Engineering
301006	Seminar	CO1 - Appraise the current civil engineering research / techniques / developments / interdisciplinary areas.
		CO2 - Review and organize literature survey utilizing technical resources, journals etc.
		CO3 - Evaluate and draw conclusions related to technical content studied.
		CO4 - Demonstrate the ability to perform critical writing by preparing a technical report.
		CO5 - Develop technical writing and presentation skills.

**Course Outcomes (COs) SEM-II**  
**TE (Civil Engineering) -2019 Pattern**

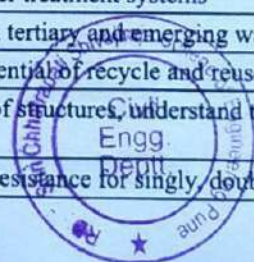
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		CO5 - State material and human resource management techniques in construction.
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301006	Seminar	CO1 - Appraise the current civil engineering research / techniques / developments / interdisciplinary areas.
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		CO3 - Evaluate and draw conclusions related to technical content studied.
		CO4 - Demonstrate the ability to perform critical writing by preparing a technical report.
		CO5 - Develop technical writing and presentation skills.

**Course Outcomes (COs) SEM-II  
TE (Civil Engineering) -2019 Pattern**

Course Code	Name of Subject/ Course	Course Outcome (COs)
301012	Waste Water Engineering	CO1 - Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
		CO2 - Design preliminary and primary unit operations in waste water treatment plant
		CO3 - Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
		CO4 - Understand and design suspended and attached growth wastewater treatment systems
		CO5 - Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
		CO6-Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment
		CO1 - Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete
		CO2 - Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections

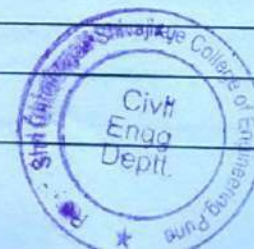


301013	Design of RC Structures	CO3 - Design & detailing of rectangular one way and two-way slab with different boundary conditions
		CO4 - Design & detailing of dog legged and open well staircase
		CO5 - Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion
		CO6-Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.
301014	Remote Sensing and GIS	CO1 - To comprehend fundamentals and principles of RS and GIS techniques
		CO2 - To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
		CO3 - To develop skills of Image processing and GIS
		CO4 - To utilize RS and GIS techniques in Engineering Geology and civil engineering.
		CO5 - To study satellite image processing, satellite image interpretation, digitization and generation of thematic maps in a GIS.
		CO6-To learn buffering and layer analysis for civil engineering applications
301015	Elective II Solid Waste Management	CO1 - Outline solid waste management systems with respect to its generation rate (quantity), sampling, characteristics and regulatory/legal requirements.
		CO2 - Explain and suggest relevant method of storage, collection and transportation of solid waste for the given site condition with justification.
		CO3 - Develop understanding of technological applications for processing and material recovery from solid waste with its economics and design composting system for organic waste.
		CO4 - Describe the fundamental and technological aspects of waste to energy systems from solid waste and to design anaerobic digester and incineration system.
		CO5 - Describe the fundamental and technological aspects of waste to energy systems from solid waste and to design anaerobic digester and incineration system.
		CO6- Explain the functional element for management of special waste and suggest the relevant method of reuse and recycling for the given type of waste in the given situation
301016	Internship	CO1 - To develop professional competence through industry internship
		CO2 - To apply academic knowledge in a personal and professional environment
		CO3 - To build the professional network and expose students to future employees
		CO4 - Apply professional and societal ethics in their day to day life
		CO5 - To become a responsible professional having social, economic and administrative considerations
		CO6- To make own career goals and personal aspirations
301021	Audit Course II: Leadership and Personality Development/ Industrial Safety	CO1 - To develop inter personal skills and bean effective goal oriented team player.
		CO2 - To develop professionals with idealistic, practical and moral values.
		CO3 - To develop communication and problem solving skills.
		CO4 - Tore-engineer attitude and understand its influence on behavior

**Course Outcomes (COs) SEM-I**  
**BE (Civil Engineering) -2015 Pattern**

Course Code	Name of Subject/ Course
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Course Outcome (COs)





401001	Environmental Engineering II	CO1 - To know and comprehend concepts of waste water quality and standards, propagation & wastewater collection system
		CO2 - To determine the methods for design of sewerage system components
		CO3 - To know about characteristics of solid waste and problems associated with solid waste disposal.
		CO4 - To know about various methods of solid waste treatment
		CO5 - To understand the sources and characteristics, Effects of Discharges of Industrial Waste on receiving bodies of water.
		CO6 - To understand the methods of treatment of Industrial Wastewater.
401002	Transportation Engineering	CO1-Should able to know various hierarchical levels of transport planning.
		CO2-To understand the material property for highway engineering.
		CO3-"To understand traffic Characteristics, traffic engineering studies, traffic flow and capacity, traffic regulation and control devices"
		CO4-Understand the different important engineering properties of road material like aggregate and binding materials
		CO5-To make students acquainted with various type of pavement and their analysis.
		CO6-They should understand the various components of pavement management system and pavement maintenance management system.
401003	Structural Design and Drawing III	CO 1-Analyze a prestressed concrete beam accounting for losses also design the anchorage zone for post tensioned members
		CO2-Analyze & design of vertical & horizontal shear in post tensioned prestressed concrete for flange section and the design of post tensioned.
		CO3-Design of prestressed two way flat slab by direct design method
		CO4-Develop an appreciation of the design philosophy for deep excavation and retaining wall projects
		CO5-Design structural elements of a water tanks for serviceability limit state of crack control and ultimate limit state
		CO6-Identify various methods of analysis and design for frame type structure under lateral and vertical loading condition
401004	Architecture & Town Planning (ELE-I)	CO1 - Awareness of the role of an urban planner and architect in planning, designing and landscaping.
		CO2 - Able to identify significance of built environment, urban design, renewal for quality of life and livability.
		CO3 - Able to explain the importance of Sustainable development.
		CO4 - Able to define stages of town planning and development through study of planning of new towns.
		CO5 - Able to explain the importance of surveys and hierarchy of planning.
		CO6 - Aware of the acts related to the planning of a region and a town.
401005	TQM & MIS in Civil Engineering (ELE-II)	CO1 - To study the importance of quality in construction.
		CO2 - To study MIS and its application in construction.
		CO3 - To identify defects and its prevention and TQM philosophy of Six Sigma.
		CO4- Importance of Total Quality Management and ISO in construction.
		CO5 - To study applications of TQM and different philosophies like Kaizen, Benching and Supply chain management.
		CO6 - To study ERP system and its importance.
401006	Project Stage I	CO1-Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas
		CO2-Review and organize literature survey utilizing technical resources, journals etc
		CO3-Evaluate and draw conclusions related to technical content studied.
		CO4-Demonstrate the ability to perform critical writing by preparing a technical report.
		CO5-Develop technical writing and presentation skills.

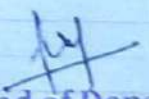
**Course Outcomes (COs) SEM-II**



## BE (Civil Engineering) -2015 Pattern

401007	Dams and Hydraulics Structure	CO1-Understand the various types of dams and select a particular type considering technical, economic, environmental, climatic, topographic and social factors also the importance of dam safety and instrumentation required to assess the health of dam.
		CO2-Understand the construction & maintenance of gravity dam, arch dam, buttress dam and Carry out stability analysis of gravity dam
		CO3-Acquire knowledge about components, classification, significance, selection and Design of spillway, energy dissipating devices, spillway gates
		CO4-Acquire knowledge about Design and Failure aspect of earthen dam and Design of Diversion Head Works
		CO5-Able to Design Canal and Canal Structure
		CO6-Understand the cross drainage works and River training structure
401008	Quantity Surveying	CO1 - Able to find out Estimates for given construction work.
		CO2 - Able to analyse the rate of materials of labours while estimating as per the given specification.
		CO3 - Able to apply basics of valuation to find out value of a property.
		CO4 - Able to Understand and apply the procedure of Tendering, Contract and Arbitration including work of statutory bodies like PWD etc.
401009	Hydro Power Engineering (ELE-III)	CO1 - Understand and discuss energy resources and energy systems available for production of electric power in India and world.
		CO2 - Explain the types of hydro power plants.
		CO3 - Explain the load assessment and estimation of hydro power potential.
		CO4 - Explain the planning of layout of hydro power plant.
		CO5 - Design of the penstocks and surge shaft.
		CO6 - Discuss the economic conditions, legal conditions and consequences of hydro power.
401010	Construction Management (ELE-IV)	CO1 - Understand the roles and responsibilities of a project manager
		CO2 - Prepare schedule of activities in a construction project.
		CO3 - Prepare tender and contract document for a construction project.
		CO4 - Understand safety practices in construction industry.
		CO5 - Identify the equipment used in construction.
401016	Project Stage II	CO1-Appraise the current Civil Engineering research/techniques/developments/interdisciplinary areas
		CO2-Review and organize literature survey utilizing technical resources, journals etc
		CO3-Evaluate and draw conclusions related to technical content studied.
		CO4-Demonstrate the ability to perform critical writing by preparing a technical report.
		CO5-Develop technical writing and presentation skills.



  
**Head of Department**  
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