



CAYMET's
Siddhant College of Engineering
Savitribai Phule Pune University, Pune
First Year Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name - 107001 - Engineering Mathematics – I

Course Objectives

To make the students familiarize with concepts and techniques in Calculus, Fourier series and Matrices. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their discipline

Course Outcomes

The students will be able to learn

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

Subject Code & Name - 107002 - Engineering Physics

Course Objectives:

To teach students basic concepts and principles of physics, relate them to laboratory experiments and their applications

Course Outcomes:

On completion of the course, learner will be able to—

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.

Subject Code &Name -102003 - Systems in Mechanical Engineering

Course Objectives:

1. To identify the sources of energy and their conversions
2. To explain the basic concept of engineering thermodynamics and its application
3. To understanding the specifications of vehicles
4. To get acquainted with vehicle systems
5. To introduce manufacturing processes applying proper method to produce components
6. To be able to select and compare domestic appliances

Course Outcomes

On completion of the course, learner will be able to

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

Subject Code &Name -103004 - Basic Electrical Engineering

Course Objectives:

1. To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2. To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3. To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits.

4. To provide knowledge of the concepts of transformer, different energy conversions techniques.

Course Outcomes:

At the end of course students will be able to

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.

Subject Code & Name - 110005 - Programming and Problem Solving

Course Objectives:

Prime objective is to give students a basic introduction to programming and problem solving with computer language Python. And to introduce students not merely to the coding of computer programs, but to computational thinking, the methodology of computer programming, and the principles of good program design including modularity and encapsulation.

1. To understand problem solving, problem solving aspects, programming and to know about various program design tools.
2. To learn problem solving with computers
3. To learn basics, features and future of Python programming.
4. To acquaint with data types, input output statements, decision making, looping and functions in Python
5. To learn features of Object Oriented Programming using Python
6. To acquaint with the use and benefits of files handling in Python

Course Outcomes: On completion of the course, learner will be able to–

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 environment.

Subject Code &Name -111006 -Workshop Practice

Course Objectives:

1. To understand the construction and working of machine tools and functions of its parts.
2. To develop the skill through hands-on practices using hand tools, power tools, machine tools in manufacturing and assembly shop leading to understanding of a production processes.
3. To understand workshop layout and safety norms.

Course Outcomes:

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.

Subject Code &Name -101007-Environmental Studies-I

Course Objectives:

1. To explain the concepts and strategies related to sustainable development and various components of environment.
2. To examine biotic and abiotic factors within an ecosystem, to identify food chains, webs, as well as energy flow and relationships.
3. To identify and analyze various conservation methods and their effectiveness in relation to renewable and nonrenewable natural resources.
4. To gain an understanding of the value of biodiversity and current efforts to conserve biodiversity on national and local scale.

Course Outcomes: On completion of the course, learner will be able to–

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

SEM II

Subject Code & Name -107009-Engineering Chemistry

Course Objectives:

1. To understand technology involved in analysis and improving quality of water as commodity.
2. To acquire the knowledge of electro-analytical techniques that facilitates rapid and precise understanding of materials.
3. To understand structure, properties and applications of speciality polymers and nano material.
4. To study conventional and alternative fuels with respect to their properties and applications.
5. To study spectroscopic techniques for chemical analysis.
6. To understand corrosion mechanisms and preventive methods for corrosion control

Course Outcomes:

On completion of the course, learner will be able to–

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.

Subject Code & Name -104010-Basic Electronics Engineering

Course Objectives:

1. The principle of electronics and working principle of PN junction diode and special purpose diodes.
2. The functioning of transistors like BJT, MOSFETs and OPAMP.
3. Basics of various logic gates, digital circuits and their applications.
4. Working and functions of various electronic instruments.
5. The operating principles and applications of various active and passive sensors.
6. Basic principles of communication systems.

Course Outcomes: On completion of the course, learner will be able to–

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

Subject Code &Name -101011- Engineering Mechanics

Course Objectives:

1. To impart knowledge about force systems and methods to determine resultant centroid and moment of inertia
2. To teach methods to calculate force of friction
3. To impart knowledge to determine reaction of beams, calculate member forces in trusses, cables and frames using principles of equilibrium
4. To teach space force systems
5. To train students to solve problems related to particle mechanics using principles of kinematics, kinetics and work power energy

Course Outcomes:

On completion of the course, learner will be able to–

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

Subject Code &Name -102012- Engineering Graphics

Course Objectives

1. To acquire basic knowledge about engineering drawing language, line types, dimension methods, and simple geometrical construction.
2. To draw conic sections by various methods, involutes, cycloid and spiral.
3. To acquire basic knowledge about physical realization of engineering objects and shall be able to draw its different views.
4. To visualize three dimensional engineering objects and shall be able to draw their isometric views.
5. To imagine visualization of lateral development of solids.
6. To acquire basic knowledge about the various CAD drafting software's and its basic commands required to construct the simple engineering objects.

Course Outcomes:

On completion of the course, learner will be able to

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.

Subject Code &Name -110013-Project Based Learning**Course Objectives:**

1. To emphasizes learning activities that are long-term, interdisciplinary and student-centric.
2. To inculcate independent learning by problem solving with social context.
3. To engages students in rich and authentic learning experiences.
4. To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.

Course Outcomes:

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.

Subject Code &Name -101014 -Environmental Studies-II**Course Objectives:**

1. To provide a comprehensive overview of environmental pollution and the science and technology associated with the monitoring and control.
2. To understand the evolution of environmental policies and laws.
3. To explain the concepts behind the interrelations between environment and the development.
4. To examine a range of environmental issues in the field, and relate these to scientific theory.

Course Outcomes: On completion of the course, learner will be able to–

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

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Second Year Civil Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name -201001 - Building Technology and Architectural Planning Course Objectives

Course Objectives

1. To enumerate different types of structure and their requirement.
2. To describe all basic activities of construction.
3. To study different types of materials, byelaws and Architectural aspects used in construction for civil engineering projects.
4. To plan different building units, Town planning parameters and safety of buildings

Course Outcomes

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

1. Identify types of building and basic requirements of building components.
2. Make use of Architectural Principles and Building byelaws for building construction.
3. Plan effectively various types of Residential Building forms according to their utility, functions with reference to National Building Code.
4. Plan effectively various types of Public Buildings according to their utility functions with reference to National Building Code.
5. Make use of Principles of Planning in Town Planning, Different Villages and Safety aspects.
6. Understand different services and safety aspects

Subject Code & Name -201002 Mechanics of Structures

Course Objectives

1. To study various types of stresses for determinate structural members.
2. To learn concept of Shear Force and Bending Moment Diagram for determinate beams.
3. To learn the concept of slope and deflection for determinate structural members.

Course Outcomes

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

1. Understand concept of stress-strain and determine different types of stress, strain in determinate, indeterminate homogeneous and composite structures.
2. Calculate shear force and bending moment in determinate beams for different loading conditions and illustrate shear force and bending moment diagram.
3. Explain the concept of shear and bending stresses in beams and demonstrate shear and bending stress distribution diagram.
4. Use theory of torsion to determine the stresses in circular shaft and understand concept of Principal stresses and strains.
5. Analyze axially loaded and eccentrically loaded column.
6. Determine the slopes and deflection of determinate beams and trusses.

Subject Code & Name – 201003 Fluid Mechanics

Course Objectives

1. To understand conceptually the properties of fluid, fluid statics, fluid kinematics and fluid dynamics, dimensional analysis, boundary layer theory, open channel flow and fluid flow around submerged objects.
2. Apply principles of continuity, mass, momentum and energy as applied to fluid at rest as well as for fluid flow in open channel.
3. To apply fundamental principles of fluid mechanics for the solution of practical Civil Engineering problems

Course Outcomes

At the end of the course, the learners will be able to

1. 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.
2. 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
3. Understand the concept of Dimensional analysis using Buckingham's π theorem, Similarity & Model Laws and boundary layer theory and apply it for solving practical problems of fluid flow.
4. 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.
5. 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.
6. 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 submerged body.

Subject Code &Name -207001 Engineering Mathematics III

Course Objectives

1. To make the students familiarize with concepts and techniques in Ordinary & Partial differential equations, Numerical methods, Statistical methods, Probability theory and Vector calculus.
2. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines

Course Outcomes

At the end of this course, students will be able to

1. 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.
2. 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.
3. Apply Statistical methods like correlation, regression and probability theory in data analysis and predictions in civil engineering.
4. Perform Vector differentiation & integration, analyze the vector fields and apply to fluid flow problems.
5. Solve Partial differential equations such as wave equation, one and two dimensional heat flow equations.

Subject Code &Name -207009 Engineering Geology

Course Objectives

1. To get the knowledge of the physical properties of mineral and differentiate between the rocks types, their inherent characteristics with Civil Engineering applications.
2. To learn geomorphic features formed by fluvial, marine processes and their role, Indian stratigraphy and historical geology in civil engineering projects.
3. To comprehend Structural geology applied to civil engineering projects and to get idea about plate tectonics.
4. To acquire and apply knowledge of PGE essential for civil engineering projects.
5. To identify and to enable the Students to examine favorable & unfavorable conditions for the proposed construction of dams, reservoir and tunnels. Precautions and treatments required to improve the site conditions of dams, reservoir and tunnels.
6. To learn the role played by the effect of Ground water, Geological hazards and the requirement and utility of good building stone.

Course Outcomes

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

1. 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.
2. 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.
3. Recognize effect of plate tectonics, structural geology and their significance and utility in civil engineering activities.
4. 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.
5. Assess the Importance of geological nature of the site, precautions and treatments to improve the site conditions for dams, reservoirs, and tunnels.
6. Explain geological hazards and importance of ground water and uses of common building stones.

Subject Code &Name - Audit Course I -Awareness to Civil Engineering Practices

Course Objectives

1. To provide basic overview of functioning of different Civil Engineering related industries / firms.
2. To create awareness about application of different drawings, contract documents in Civil Engineering.
3. To provide insight of code of ethics, duties and responsibilities, health and safety as a Civil Engineer

Course Outcomes

On completion of the course, learner will be able to...

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.

SEM II

Subject Code &Name -201008 Geotechnical Engineering

Course Objectives

1. To describe soil properties, classification and its behavior under stress.
2. To learn methods for measurements and determination of index & engineering properties of soil.
3. To study the interaction between water and soil and the effects of static vs flowing water on soil strength

Course Outcomes

On completion of the course, learner will be able to,

1. Identify and classify the soil based on the index properties and its formation process
2. Explain permeability and seepage analysis of soil by construction of flow net.
3. Illustrate the effect of compaction on soil and understand the basics of stress distribution.
4. Express shear strength of soil and its measurement under various drainage conditions.
5. Evaluate the earth pressure due to backfill on retaining structures by using different theories.
6. Analysis of stability of slopes for different types of soils.

Subject Code &Name -201009 Surveying

Course Objectives

With the successful completion of the course, the student should have the capability to:

- 1 Describe the function of surveying in civil engineering construction,
- 2 Identify the sources of measurement errors and mistakes; understand the difference between accuracy and precision as it relates to distance, differential leveling, and angular measurements,
- 3 Identify and calculate the errors in measurements and to develop corrected values for differential level circuits, horizontal distances and angles for open or closed-loop traverses,
- 4 Effectively communicate with team members during field activities; identify appropriate safety procedures for personal protection; properly handle and use measurement instruments.
- 5 Be able to identify hazardous environments and take measures to insure one's personal and team safety
- 6 Perform traverse calculations; determine latitudes, departures, and coordinates of control points and balancing errors in a traverse. Use appropriate software for calculations and plotting.
- 7 Operate a total station to measure distance, angles, and to calculate differences in elevation. Reduce data for application in a geographic information system,
- 8 Work as a team member on a surveying party to achieve a common goal of accurate and timely project completion,

9 Calculate, design and establish curves, Understand, interpret, and prepare plan, profile, and cross-section drawings, Work with cross-sections and topographic maps to calculate areas, volumes, and earthwork quantities.

Course Outcomes

On successful completion of this course, Student will be able to:

1. Define and Explain basics of plane surveying and differentiate the instruments used for it.
2. Express proficiency in handling surveying equipment and analyse the surveying data from these equipment.
3. Describe different methods of surveying and find relative positions of points on the surface of earth.
4. Execute curve setting for civil engineering projects such as roads, railways etc.
5. Articulate advancements in surveying such as space based positioning systems

Subject Code & Name -201010 Concrete Technology

Course Objectives

1. To know properties of various ingredients of concrete and concept of mix design.
2. To learn the behavior and properties of concrete in fresh and hardened state.
3. To understand special concrete and their applications.
4. To understand the durability aspects and preventive measures to enhance the life of concrete.

Course Outcomes

1. Able to select the various ingredients of concrete and its suitable proportion to achieve desired strength.
2. Able to check the properties of concrete in fresh and hardened state.
3. Get acquainted to concreting equipments, techniques and different types of special concrete.
4. Able to predict deteriorations in concrete and get acquainted to various repairing methods and techniques.

Subject Code & Name -201011 Structural Analysis

Course Objectives

1. This subject will build on the concepts from Engineering Mechanics and Mechanics of Structures.
2. This will create a foundation for analyzing real life structures by imparting knowledge about various methods involved in the analysis of indeterminate structures.

Course Outcomes

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

1. Understand the basic concept of static and kinematic indeterminacy and analysis of indeterminate beams.
2. Analyze redundant trusses and able to perform approximate analysis of multi-story multi-bay frames.
3. Implement application of the slope deflection method to beams and portal frames.

4. Analyze beams and portal frames using moment distribution method.
5. Determine response of beams and portal frames using structure approach of stiffness matrix method.
6. Apply the concepts of plastic analysis in the analysis of steel structures.

Subject Code &Name -201012 Project Management

Course Objectives

Students will be able to:

1. **Describe** the various concepts involved in Project Management.
2. **Explain** scientific methods of planning and management
3. **Segregate** the materials as per their annual usage and **explain** process to find production rate of construction equipment
4. **Demonstrates** methods of manpower planning and **Use** various project monitoring methods.
5. **Discuss** engineering economics and different laws associated with project management.
6. **Differentiate** the methods of project selection and **recommend** the best economical project

Course Outcomes

On completion of the course, student will:

1. **Describe** project life cycle and the domains of Project Management.
2. **Explain** networking methods and their applications in planning and management
3. **Categorize** the materials as per their annual usage and also **Calculate** production rate of construction equipment
4. **Demonstrates** resource allocation techniques and **apply** it for manpower planning.
5. **Understand** economical terms and different laws associated with project management
6. **Apply** the methods of project selection and **recommend** the best economical project

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Second Year Computer Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Program Outcomes

1. PO1. Engineering knowledge Apply the knowledge of mathematics, science, Engineering fundamentals, and an Engineering specialization to the solution of complex Engineering problems.
2. PO2. Problem analysis Identify, formulate, review research literature and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and Engineering sciences.
3. PO3. Design / Development of Solutions Design solutions for complex Engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and Environmental considerations.
4. PO4. Conduct Investigations of Complex Problems Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. PO5. Modern Tool Usage Create, select, and apply appropriate techniques, resources, and modern Engineering and IT tools including prediction and modelling to complex Engineering activities with an understanding of the limitations.
6. PO6. The Engineer and Society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practices.
7. PO7. Environment and Sustainability understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. PO8. Ethics Apply ethical principles and commit to professional ethics and responsibilities and norms of Engineering practice.
9. PO9. Individual and Team Work Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. PO10. Communication Skills Communicate effectively on complex Engineering activities with the Engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. PO11. Project Management and Finance Demonstrate knowledge and understanding of Engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary Environments.
12. PO12. Life-long Learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Subject Code &Name -210241 Discrete Mathematics

Course Objectives

1. To use appropriate set, function and relation models to understand practical examples, and interpret the associated operations and terminologies in context.
2. Determine number of logical possibilities of events.
3. Learn logic and proof techniques to expand mathematical maturity.
4. Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.

Course Outcomes

On completion of the course, learner will be able to

1. Formulate problems precisely, solve the problems, apply formal proof techniques, and explain the reasoning clearly.
2. Apply appropriate mathematical concepts and skills to solve problems in both familiar and unfamiliar situations including those in real-life contexts.
3. Design and analyze real world engineering problems by applying set theory, propositional logic and to construct proofs using mathematical induction.
4. Specify, manipulate and apply equivalence relations; construct and use functions and apply these concepts to solve new problems.
5. Calculate numbers of possible outcomes using permutations and combinations; to model and analyze computational processes using combinatorics.
6. Model and solve computing problem using tree and graph and solve problems using appropriate algorithms.

7. Analyze the properties of binary operations, apply abstract algebra in coding theory and evaluate the algebraic structures.

Subject Code &Name -210242 Fundamentals of Data Structures

Course Objectives

1. To understand the basic techniques of algorithm analysis.
2. To understand various algorithmic strategies to approach the problem solution.
3. To understand the memory requirement for various data structures.
4. To understand various data searching and sorting methods with pros and cons.
5. To acquaint with the structural constraints and advantages in usage of the data.
6. To understand the standard and abstract data representation methods.
7. To identify the appropriate data structure and algorithm design method for a specified application.

Course Outcomes

On completion of the course, learner will be able to–

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

Subject Code &Name -210243 Object Oriented Programming (OOP)

Course Objectives

1. To explore & understand the principles of Object Oriented Programming (OOP).
2. To use the object-oriented paradigm in program design.
3. To provide object-oriented programming insight using C++
4. To lay a foundation for advanced programming.

Course Outcomes

Course Outcomes: On completion of the course, learner will be able to–

1. Apply constructs-sequence, selection and iteration; classes and objects, inheritance, use of predefined classes from libraries while developing software.
2. Design object-oriented solutions for small systems involving multiple objects.
3. Use virtual and pure virtual function and complex programming situations.
4. Apply object-oriented software principles in problem solving.
5. Analyze the strengths of object-oriented programming.
6. Develop the application using object-oriented programming language (C++).

Subject Code &Name -210244: Computer Graphics

Course Objectives

1. **Remembering:** To acquaint the learner with the basic concepts of Computer Graphics
2. **Understanding:** To learn the various algorithms for generating and rendering graphical figures.
3. **Applying:** To get familiar with mathematics behind the graphical transformations
4. **Understanding:** To understand and apply various methods and techniques regarding projections, animation, shading, illumination and lighting
5. **Creating:** To generate Interactive graphics using OpenGL

Course Outcomes

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

1. Identify the basic terminologies of Computer Graphics and interpret the mathematical foundation of the concepts of computer graphics.
2. Apply mathematics to develop Computer programs for elementary graphic operations.
3. Illustrate the concepts of windowing and clipping and apply various algorithms to fill and clip polygons.
4. Understand and apply the core concepts of computer graphics, including transformation in two and three dimensions, viewing and projection.
5. Understand the concepts of color models, lighting, shading models and hidden surface elimination.
6. Create effective programs using concepts of curves, fractals, animation and gaming.

Subject Code &Name -210245 Digital Electronics and Logic Design

Course Objectives

1. To study number systems and develop skills for design and implementation of combinational logic circuits and sequential circuits
2. To understand the functionalities, properties and applicability of Logic Families.

3. To introduce programmable logic devices and ASM chart and synchronous state machines.
4. To basics of microprocessor.

Course Outcomes

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

1. Simplify Boolean Expressions using K Map.
2. Design and implement combinational circuits.
3. Design and implement sequential circuits.
4. Develop simple real-world application using ASM and PLD.
5. Differentiate and choose appropriate logic families IC packages as per the given design specifications.
6. Explain organization and architecture of computer system.

Subject Code &Name - 210246 Humanity & Social Science

Course Objectives

1. To facilitate Holistic growth
2. To Educate about Contemporary ,National and International affairs
3. To bring awareness about the responsibility towards society.
4. To give an insight about the emergence of Indian society and the relevance of Economics.

Course Outcomes

1. Aware of the various issues concerning humans and society.
2. Aware about their responsibilities towards society.
3. Sensitized about broader issues regarding the social, cultural, economic and human aspects, involved in social changes.
4. Able to understand the nature of the individual and the relationship between self and the community.
5. Able to understand major ideas, values, beliefs, and experiences that have shaped human history and cultures.

Subject Code &Name - AC3-IV Smart Cities

Course Objectives

1. To identify urban problems
2. To study Effective and feasible ways to coordinate urban technologies.
3. To study models and methods for effective implementation of Smart Cities.
4. To study new technologies for Communication and Dissemination.
5. To study new forms of Urban Governance and Organization.

Course Outcomes

On completion of the course, learner will be able to–

1. Better understanding of the dynamic behavior of the urban system by going beyond the physical appearance and by focusing on representations, properties and impact factors
2. Exploration of the city as the most complex human-made organism with a metabolism that can be modeled in terms of stocks and flows
3. Knowledge about data-informed approaches for the development of the future city, based on crowd sourcing and sensing
4. Knowledge about the latest research results in for the development and management of future cities
5. Understanding how citizens can benefit from data-informed design to develop smart and responsive cities

SEM II

Subject Code &Name – 210252 Mathematics III

Course Outcomes

On completion of the course, learner will be able to

1. Solve Linear differential equations, essential in modelling and design of computer-based systems.
2. Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
3. Apply Statistical methods like correlation and regression analysis and probability theory for data analysis and predictions in machine learning.
4. Solve Algebraic and Transcendental equations and System of linear equations using numerical techniques.
5. Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.

Subject Code &Name -210252 Data Structures and Algorithms

Course Objectives

1. To develop a logic for graphical modeling of the real life problems.
2. To suggest appropriate data structure and algorithm for graphical solutions of the problems.
3. To understand advanced data structures to solve complex problems in various domains.
4. To operate on the various structured data
5. To build the logic to use appropriate data structure in logical and computational solutions.
6. To understand various algorithmic strategies to approach the problem solution.

Course Outcomes

On completion of the course, learner will be able to

1. Identify and articulate the complexity goals and benefits of a good hashing scheme for real-world applications.
2. Apply non-linear data structures for solving problems of various domain.
3. Design and specify the operations of a nonlinear-based abstract data type and implement them in a high-level programming language.
4. Analyze the algorithmic solutions for resource requirements and optimization
5. Use efficient indexing methods and multiway search techniques to store and maintain data.
6. Use appropriate modern tools to understand and analyze the functionalities confined to the secondary storage.

Subject Code & Name -210253 Software Engineering

Course Objectives

1. To learn and understand the principles of Software Engineering.
2. To be acquainted with methods of capturing, specifying, visualizing and analyzing software requirements.
3. To apply Design and Testing principles to S/W project development.
4. To understand project management through life cycle of the project.

Course Outcomes

On completion of the course, learner will be able to

1. Analyze software requirements and formulate design solution for a software.
2. Design applicable solutions in one or more application domains using software engineering approaches that integrate ethical, social, legal and economic concerns.
3. Apply new software models, techniques and technologies to bring out innovative and novelistic solutions for the growth of the society in all aspects and evolving into their continuous professional development.
4. Model and design User interface and component-level.
5. Identify and handle risk management and software configuration management.
6. Utilize knowledge of software testing approaches, approaches to verification and validation.
7. 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.

Subject Code &Name -210254 Microprocessor

Course Objectives

1. To learn the architecture and programmer's model of advanced processor
2. To understand the system level features and processes of advanced processor
3. To acquaint the learner with application instruction set and logic to build assembly language programs.
4. To understand debugging and testing techniques confined to 80386 DX

Course Outcomes

On completion of the course, learner will be able to

1. Exhibit skill of assembly language programming for the application.
2. Classify Processor architectures.
3. Illustrate advanced features of 80386 Microprocessor.
4. Compare and contrast different processor modes.

5. Use interrupts mechanism in applications
6. Differentiate between Microprocessors and Microcontrollers.
7. Identify and analyze the tools and techniques used to design, implement, and debug microprocessor-based systems.

Subject Code &Name -210255 Principles of Programming Languages

Course Objectives

1. To learn basic principles of programming languages and programming paradigms
2. To learn structuring the data and manipulation of data, computation and program structure
3. To learn Object Oriented Programming (OOP) principles using Java Programming Language
4. To learn basic concepts of logical and functional programming language

Course Outcomes

On completion of the course, learner will be able to

1. Make use of basic principles of programming languages.
2. Develop a program with Data representation and Computations.
3. Develop programs using Object Oriented Programming language : Java.
4. Develop application using inheritance, encapsulation, and polymorphism.
5. Demonstrate Multithreading for robust application development.
6. Develop a simple program using basic concepts of Functional and Logical programming paradigm.

Subject Code &Name -210259 Code of Conduct

Course Objectives

1. To promote ethics, honesty and professionalism.
2. To set standards that are expected to follow and to be aware that If one acts unethically what are the consequences.
3. To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
4. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis
5. To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.

Course Outcomes

On completion of the course, learner will be able to

1. Understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field.
2. Aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis.
3. Understand the impact of the professional Engineering solutions in societal and Environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
4. Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.

Subject Code &Name -210260 Project Based Learning

Course Objectives

1. To develop critical thinking and problem-solving ability by exploring and proposing solutions to realistic/social problem.
2. To Evaluate alternative approaches, and justify the use of selected tools and methods,
3. To emphasizes learning activities that are long-term, inter-disciplinary and student-centric.
4. To engages students in rich and authentic learning experiences.
5. To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.
6. To develop an ecosystem this may promote entrepreneurship and research culture among the students.

Course Outcomes

On completion of the course, learner will be able to

1. Ability to solve real life problems by applying knowledge.
2. Ability to analyze alternative approaches, apply and use most appropriate one for feasible solution.
3. Ability to understand basics of IT Project management
4. Students should be able to accept and meet challenges in the real world, mirroring what professionals do every day.
5. Able to Classify software applications and identify unique features of various domains
6. 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.

Subject Code &Name - AC4-II Intellectual Property Rights and Patents

Course Objectives

1. To encourage research, scholarship, and a spirit of inquiry
2. To encourage students at all levels to develop patentable technologies.
3. To provide environment to the students of the Institute for creation, protection, and commercialization of intellectual property and to stimulate innovation.

Course Outcomes

On completion of the course, learner will be able to–

1. Understand the fundamental legal principles related to confidential information, copyright, patents, designs, trademarks and unfair competition
2. Identify, apply and assess principles of law relating to each of these areas of intellectual property
3. Apply the appropriate ownership rules to intellectual property you have been involved in creating

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CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Second Year Electronics & Telecommunication Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name - 207005 Engineering Mathematics - III

Program Outcome

1. To make the students familiarize with concepts and techniques in Ordinary differential equations, Fourier Transform, Z-Transform, Numerical methods, Vector calculus and functions of a Complex variable.
2. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes

On completion of the course, learner will be able to-

1. CO1: Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.
2. CO2: Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.
3. 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.
4. CO4: Perform vector differentiation & integration, analyze the vector fields and apply to electro-magnetic fields & wave theory.
5. CO5: Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.

Subject Code & Name - 204181-Electronic Circuits

Program Outcome

To make the students understand

1. Semiconductor device MOSFET, its characteristics, parameters & applications.
2. Concepts of feedbacks in amplifiers & oscillators.

3. Operational amplifier, concept, parameters & applications.
4. ADC, DAC as an interface between analog & digital domains.
5. Voltage to current and current to voltage converters.
6. Concepts, characteristics & applications of PLL.

Course Outcomes

On completion of the course, learner will be able to -

1. CO1: Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.
2. CO2: Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.
3. CO3: Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.
4. CO4: Explain internal schematic of Op-Amp and define its performance parameters.
5. CO5: Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.
6. CO6: Understand and compare the principles of various data conversion techniques and PLL with their applications.

Subject Code & Name -204182-Digital Circuits

Program Outcome:

1. To make the students understand
2. The fundamental principles of two-valued logic and various devices used to implement logical operations on variables.
3. Boolean algebra, Karnaugh maps and its application to the design and characterization of digital circuits.
4. To analyze logic processes and implement logical operations using combinational logic circuits.
5. The principles of logic design and use of simple memory devices, flip-flops, and sequential circuits.
6. Concepts of sequential circuits and to analyze sequential systems in terms of state machines.
7. System design approach using programmable logic devices.

Course Outcomes: On completion of the course, learner will be able to -

1. CO1: Identify and prevent various hazards and timing problems in a digital design.
2. CO2: Use the basic logic gates and various reduction techniques of digital logic circuit.
3. CO3: Analyze, design and implement combinational logic circuits.
4. CO4: Analyze, design and implement sequential circuits.

5. CO5: Differentiate between Mealy and Moore machines.
6. CO6: Analyze digital system design using PLD.

Subject Code &Name – 204183-Electrical Circuits

Program Outcome:

1. To analyze simple DC and AC circuits with circuit simplification techniques.
2. To formulate and analyze driven and source free RL and RC circuits.
3. To formulate & determine network parameters for given network.
4. To understand the constructional details, characteristics, features and application areas of various types of electric motors.

Course Outcomes: On completion of the course, learner will be able to -

1. CO1: Analyze the simple DC and AC circuit with circuit simplification techniques.
2. CO2: Formulate and analyze driven and source free RL and RC circuits.
3. CO3: Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
4. CO4: Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
5. CO5: Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
6. CO6: Analyze and select a suitable motor for different applications.

Subject Code &Name -204184-Data Structures

Program Outcome:

1. To learn basic concepts of C Programming language.
2. To learn different sorting and searching algorithms and their analysis.
3. To learn linear data structures: Stack and Queue, Linked List and their applications.
4. To learn nonlinear data structures: Tree, Graph and their applications.
5. To study the systematic ways of solving problem, various methods of organizing large amount of data.
6. To solve problems using data structures such as binary tree, binary search tree, and graph and writing programs.

Course Outcomes: On completion of the course, learner will be able to -

1. CO1: Solve mathematical problems using C programming language.
2. CO2: Implement sorting and searching algorithms and calculate their complexity.

3. CO3: Develop applications of stack and queue using array.
4. CO4: Demonstrate applicability of Linked List.
5. CO5: Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.
6. CO6: Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm

SEM II

Subject Code &Name -204184-Signals & Systems

Program Outcome

1. To understand the mathematical representation of continuous and discrete time signals and systems.
2. To classify signals and systems into different categories.
3. To analyze Linear Time Invariant (LTI) systems in time and transform domains.
4. To build basics for understanding of courses such as signal processing, control system and communication.
5. To develop basis of probability and random variables.

Course Outcomes

On completion of the course, learner will be able to -

1. CO1: Identify, classify basic signals and perform operations on signals.
2. 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.
3. CO3: Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.
4. 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.
5. CO5: Define and describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.
6. CO6: Compute the mean, mean square, variance and standard deviation for given random variables using PDF.

Subject Code &Name -204192-Control Systems

Program Outcome

1. To Introduce elements of control system and their modeling using various Techniques.
2. To get acquainted with the methods for analyzing the time response and Stability of System
3. To Introduce and analyze the frequency response and Stability of System
4. To Introduce concept of root locus, Bode plots, Nyquist plots.
5. To Introduce State Variable Analysis method.
6. To get acquainted with Concepts of PID controllers and IoT based Industrial Automation.

Course Outcomes

On completion of the course, learner will be able to -

1. CO1: Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
2. CO2: Determine the (absolute) stability of a closed-loop control system.
3. CO3: Perform time domain analysis of control systems required for stability analysis.
4. CO4: Perform frequency domain analysis of control systems required for stability analysis.
5. CO5: Apply root-locus, Frequency Plots technique to analyze control systems.
6. CO6: Express and solve system equations in state variable form.
7. CO7: Differentiate between various digital controllers and understand the role of the controllers in Industrial automation

Subject Code & Name - 204193-Principles of Communication Systems

Program Outcome

1. To equip/ familiarize students with basic mathematical tools for time and frequency domain analysis of communication signal and systems.
2. To acquaint the students with the fundamental principles of modulation process and different amplitude and angle modulation systems.
3. To introduce the students with the concept of Sampling theorem and pulse modulation techniques PAM, PWM, PPM.
4. To impart pre-requisites of digital communication systems and explore digital representation techniques like PCM, DPCM, DM and ADM.
5. To highlight the issues in baseband digital transmission such as data representation, synchronization, multiplexing and ISI.

Course Outcomes

On completion of the course, learner will be able to -

1. 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.
2. CO2: Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.
3. CO3: Explain generation and detection of FM systems and compare with AM systems.
4. CO4: Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
5. CO5: Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).

6. CO6: Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.

Subject Code & Name -204194-Object Oriented Programming

Program Outcome

1. Make the students familiar with basic concepts and techniques of object oriented programming in C++ to acquaint the students with the fundamental principles of modulation process and different amplitude and angle modulation systems.
2. Develop an ability to write programs in C++ for problem solving.

Course Outcomes

On completion of the course, learner will be able to -

1. CO1: Describe the principles of object oriented programming.
2. CO2: Apply the concepts of data encapsulation, inheritance in C++.
3. CO3: Understand Operator overloading and friend functions in C++.
4. CO4: Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.
5. CO5: Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.
6. CO6: Describe and use of File handling in C++.

Subject Code &Name -204199- Employability Skills Development

Program Outcome

1. Develop good communication skills – both oral as well as written.
2. Encourage creative and critical thinking among students.
3. Nurture collaborative behavior to work efficiently in groups.

Course Outcomes

On completion of the course, learner will be able to -

1. CO1: Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.
2. 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.
3. CO3: Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.
4. CO4: Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.

5. 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.

Subject Code &Name -204200-Project Based Learning Teaching

Program Outcome

On completion of the course, learner will be able to -

1. To emphasize project based learning activities that are long-term, interdisciplinary and student-centric.
2. To inculcate independent and group learning by solving real world problem with the help of available resources. To be able to develop application based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
3. To get practical experience in all steps in the life cycle of the development of electronic systems: specification, design, implementation, and testing.
4. To be able to select and utilize appropriate hardware and software tools to design and analyze the proposed system.
5. To provide every student the opportunity to get involved either individually or as a group so as to develop team skills and learn professionalism.



CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Second Year Information Technology (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Program Educational Objectives

1. PEO1 Possess strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges.
2. PEO2 Possess knowledge and skills in the field of Computer Science and Information Technology for analyzing, designing and implementing complex engineering problems of any domain with innovative approaches.
3. PEO3 Possess an attitude and aptitude for research, entrepreneurship and higher studies in the field of Computer Science and Information Technology.
4. PEO4 Have commitment to ethical practices, societal contributions through communities and life-long learning. PEO 5 Possess better communication, presentation, time management and team work skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level.

Program Outcomes

1. PO1 An ability to apply knowledge of mathematics, computing, science, engineering and technology.
2. PO1 An ability to engage in life-long learning and continuing professional development to cope up with fast changes in the technologies/tools with the help of electives, professional organizations and extra-curricular activities.
3. PO3 Design / Development of Solutions An ability to design, implement, and evaluate a software or a software/hardware system, component, or process to meet desired needs within realistic constraints.
4. PO4 Conduct Investigations of Complex Problems An ability to identify, formulate, and provide systematic solutions to complex engineering/Technology problems.
5. PO5 Modern Tool Usage An ability to use the techniques, skills, and modern engineering technology tools, standard processes necessary for practice as a IT professional.
6. PO6 The Engineer and Society An ability to apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design of computer-based systems with necessary constraints and assumptions.

7. PO7 Environment and Sustainability An ability to analyze and provide solution for the local and global impact of information technology on individuals, organizations and society.
8. PO8 Ethics An ability to understand professional, ethical, legal, security and social issues and responsibilities;
9. PO9 Individual and Team Work An ability to function effectively as an individual or as a team member to accomplish a desired goal(s).
10. PO10 Communication Skills An ability to engage in life-long learning and continuing professional development to cope up with fast changes in the technologies/tools with the help of electives, professional organizations and extra-curricular activities;
11. PO11 Project Management and Finance An ability to communicate effectively in engineering community at large by means of effective presentations, report writing, paper publications, demonstrations;
12. PO12 Life-long Learning An ability to understand engineering, management, financial aspects, performance, optimizations and time complexity necessary for professional practice;

Program Specific Outcomes

A graduate of the Information Technology Program will demonstrate –

1. PSO 1 An ability to apply the theoretical concepts and practical knowledge of Information Technology in analysis, design, development and management of information processing systems and applications also in the interdisciplinary domain.
2. PSO 2 An ability to analyze a problem, and identify and define the computing infrastructure and operations requirements appropriate to its solution. IT graduates should be able to work on large scale computing systems.
3. PSO 3 An understanding of professional, business and business processes, ethical, legal, security and social issues and responsibilities. At times technical decisions are influenced by the needs of the business and its processes like quality control processes. An IT graduate should be able to deal with that.
4. PSO 4 Practice communication and decision making skills through the use of appropriate technology and be ready for industry culture

Subject Code & Name – 214441 Discrete Mathematics

Course Objectives

1. Gain sound knowledge to formulate and solve problems with sets and propositions.
2. To understand and solve counting problems by applying elementary counting techniques to solve problems of discrete probability.

3. To understand Graph and Tree terminologies and models to be applied in real life problems.
4. To recognize types of relation, formulate and solve problems with relations and functions.
5. To understand basics of number theory and its applications.
6. To understand the various types' algebraic structures and its applications.

Course Outcomes

On completion of the course, learner will be able to

1. Formulate, apply formal proof techniques and solve the problems with logical reasoning.
2. Analyze and evaluate the combinatorial problems by using probability theory.
3. Apply the concepts of graph theory to devise mathematical models.
4. Analyze types of relations and functions to provide solution to computational problems.
5. Identify techniques of number theory and its application.
6. Identify fundamental algebraic structures.

Subject Code &Name – 214442 Computer Organization & Logic Design

Course Objectives

1. To make undergraduates, aware of different levels of abstraction of computer systems from hardware perspective.
2. To make undergraduates, understand the functions, characteristics of various components of Computer& in particular processor & memory.

Course Outcomes

Describe the basics of thermodynamics with heat and work interactions.

1. Perform basic binary arithmetic & simplify logic expressions.
2. Grasp the operations of logic ICs and Implement combinational logic functions using ICs.
3. Comprehend the operations of basic memory cell types and Implement sequential logic Functions using ICs.
4. Elucidate the functions & organization of various blocks of CPU.
5. Understand CPU instruction characteristics, enhancement features of CPU.
6. Describe an assortment of memory types (with their characteristics) used in computer systems and basic principle of interfacing input, output devices.

Subject Code &Name - 214443 Data Structure & Algorithms

Course Objectives

1. To study data structures and their implementations and applications.

2. To learn different searching and sorting techniques
3. To study some advanced data structures such as trees, graphs and tables.
4. To learn different file organizations.
5. To learn algorithm development and analysis of algorithms.

Course Outcomes

On completion of the course, learner will be able to

1. Analyze algorithms and to determine algorithm correctness and time efficiency class.
2. Understand different advanced abstract data type (ADT) and data structures and their implementations.
3. Understand different algorithm design techniques (brute -force, divide and conquer, greedy, etc.) and their implementation.
4. Apply and implement learned algorithm design techniques and data structures to solve problems.
5. Perform basic analysis of algorithms with respect to time and space complexity.
6. Use algorithmic foundations for solving problems and programming.

Subject Code &Name - 214444 Object Oriented Programming

Course Objectives

1. Apply concepts of object oriented paradigm.
2. Design and implement models for real life problems by using object oriented programming
3. Develop object oriented programming skills.

Course Outcomes

1. Differentiate various programming paradigms and apply basic concepts of OOP.
2. Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
3. Identify relationship among objects using inheritance and polymorphism.
4. Handle different types of exceptions and perform generic programming.
5. Use file handling for real world application.
6. Apply appropriate design patterns to provide object-oriented solutions

Subject Code &Name – 214445 Basics of Computer Network

Course Objectives

1. To understand the fundamentals of communication system.
2. To understand the basics of internetworking.
3. To understand services and protocols used at Physical, Data Link, Network, Transport Layer.

Course Outcomes

1. Understand and explain the concepts of communication theory and compare functions of OSI and TCP/IP model.
2. Analyze data link layer services, error detection and correction, linear block codes, cyclic codes, framing and flow control protocols.
3. Compare different access techniques, channelization and Ethernet standards.
4. Apply the skills of subnetting, supernetting and routing mechanisms.
5. Compare IPv4 and IPv6
6. Understand services and protocols used at transport layer.

Subject Code &Name- 214446 Computer Organization & Logic Design Lab

Course Objectives

1. To design & implement combinational and sequential circuits.
2. To manage and access computer system.
3. To learn to simulate digital system

Course Outcomes

1. Use logic function representation for simplification with K-Maps and design Combinational logic circuits using SSI & MSI chips.
2. Design Sequential Logic circuits: MOD counters using synchronous counters.
3. Apply the basics of system management to access the resources of computer system.
4. Apply the basics of simulator tool & to simulate simple ALU / CPU.

Subject Code &Name -214447 Data Structure & Algorithms Lab

Course Objectives

1. To study data structures and their implementations and applications.
2. To learn different searching and sorting techniques.
3. To study some advanced data structures such as trees, graphs and tables.
4. To learn different file organizations.
5. To learn algorithm development and analysis of algorithms.

Course Outcomes

1. Analyze algorithms and to determine algorithm correctness and time efficiency class.
2. Understand different advanced abstract data type (ADT) and data structures and their implementations.

3. Understand different algorithm design techniques (brute -force, divide and conquer, greedy, etc.) and their implementation.
4. Apply and implement learned algorithm design techniques and data structures to solve problems.
5. Perform basic analysis of algorithms with respect to time and space complexity.
6. Use algorithmic foundations for solving problems and programming.

Subject Code &Name- 214448 Object Oriented Programming Lab

Course Objectives

1. Apply concepts of object oriented paradigm.
2. Design and implement models for real life problems by using object oriented programming. Develop object oriented programming skills.

Course Outcomes

1. Differentiate various programming paradigms and apply basic concepts of OOP.
2. Identify classes, objects, methods, and handle object creation, initialization, and destruction to model real-world problems.
3. Identify relationship among objects using inheritance and polymorphism.
4. Handle different types of exceptions and perform generic programming.
5. Use file handling for real world application.
6. Apply appropriate design patterns to provide object-oriented solutions.

Subject Code &Name- 214449 Soft Skills Lab

Course Outcomes

1. Introspect about individual's goals, aspirations by evaluating one's SWOC and think creatively.
2. Develop effective communication skills including Listening, Reading, Writing and Speaking.
3. Constructively participate in group discussion, meetings and prepare and deliver presentations
4. Write precise briefs or reports and technical documents.
5. Understand professional etiquette, present oneself confidently and successfully handle personal interviews CO6:Function effectively in multi-disciplinary and heterogeneous teams through the knowledge of teamwork, Inter-personal relationships, conflict management and leadership quality.

SEM II

Subject Code &Name -207003 Engineering Mathematics III

Course Objectives

1. To make the students familiarize with concepts and techniques in Linear differential equations, Fourier transform & Z-transform, Statistical methods, Probability theory and Numerical methods.
2. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance thinking power, useful in their disciplines.

Course Outcomes

On completion of the course, learner will be able to

1. Solve linear differential equations, essential in modelling and design of computer-based systems.
2. Apply concept of Fourier transform and Z-transform and its applications to continuous and discrete systems and image processing.
3. Apply Statistical methods like correlation & regression analysis and probability theory for data analysis and predictions in machine learning.
4. Solve Algebraic & Transcendental equations and System of linear equations using numerical techniques.
5. Obtain Interpolating polynomials, numerical differentiation and integration, numerical solutions of ordinary differential equations used in modern scientific computing.

Subject Code &Name – 214451 Processor Architecture

Course Objectives

1. To study architectural details of PIC 18 microcontroller.
2. To study applications of PIC through various interfacing devices.

Course Outcomes

On completion of the course, learner will be able to

1. Apprehend architecture and memory organization of PIC 18 microcontroller.
2. Implement embedded C programming for PIC 18.
3. Use concepts of timers and interrupts of PIC 18.
4. Demonstrate real life applications using PIC 18.
5. Analyze architectural details of ARM processor.

Subject Code & Name -214452 Database Management System

Course Objectives

1. The objective of the course is to present an introduction to database management system as a subject in its own right.
2. To understand the fundamental concepts of Relational Database management system.
3. To present SQL and procedural interfaces to SQL comprehensively.
4. To provide a strong formal foundation in Relational Database Concepts, database concepts, technology and practice & to introduce the concepts of Query Processing
5. To introduce the concepts of Transaction Processing and to present the issues and techniques relating to concurrency and recovery in multi-user database environments.
6. To introduce the recent trends in database technology.

Course Outcomes

On completion of the course, learner will be able to

1. Define fundamental elements of database management systems
2. Describe the fundamental elements of relational database management systems and Design ER-models to represent simple database application scenarios.
3. Populate relational database and formulate SQL queries on data.
4. Improve the database design by normalization & to incorporate query processing
5. Illustrate ACID properties for transaction management & to describe concurrency control protocols.
6. Understand recent trends in database technology.

Subject Code & Name -214453 Computer Graphics

Course Objectives

1. Understand the foundations of computer graphics: hardware systems, math basis, light and color.
2. Understand the complexities of modeling realistic objects through modeling complex scenes using a high-level scene description language.
3. Become acquainted with some advanced topics in computer graphics. The student should gain an expanded vocabulary for discussing issues relevant to computer graphics (including both the underlying mathematics and the actual programming).
4. The student should gain an appreciation and understanding of the hardware and software utilized in constructing computer graphics applications.
5. The student should gain a comprehension of windows, clipping and view-ports in relation to images displayed on screen.

6. The student should gain an understanding of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.

Course Outcomes

On completion of the course, learner will be able to

1. Specify mathematical and logical aspects for developing elementary graphics operations like scan conversion of points, lines and circle and apply it for problem solving.
2. Explain and employ techniques of geometrical transforms to produce, position and manipulate objects in 2 dimensional and 3-dimensional space respectively.
3. Describe mapping from a world coordinates to device coordinates, clipping, and projections in order to produce 3D images on 2D output device.
4. Apply the concepts of rendering, shading, animation, curves and fractals using computer graphics tools in design, development and testing of 2D, 3D modeling applications.
5. Develop the competency to understand the concepts related to Virtual reality

Subject Code &Name -214455 Software Engineering

Course Objectives

1. To learn the principles of Software Engineering.
2. To learn and understand methods of capturing, specifying, visualizing and analyzing software requirements.
3. To know design principles to software project development.
4. To learn basics of IT project management.
5. To understand software quality attributes and testing principles.
6. To introduce formal methods and recent trends in Software Engineering.

Course Outcomes

On completion of the course, learner will be able to

1. Identify various software application domains and classify software applications.
2. Analyze software requirements by applying various modeling techniques.
3. Translate the requirement models into design models.
4. Apply planning and estimation to any project.
5. Apply quality attributes and testing principles in software development life cycle.
6. Discuss recent trends in Software engineering by using CASE and agile tools.

Subject Code &Name – 214455 Programming Skill Development Lab

Course Objectives

1. To learn embedded C programming and PIC18FXXX microcontrollers.
2. To learn interfacing of real world input and output devices to PIC18FXXX microcontroller

Course Outcomes

On completion of the course, learner will be able to

1. After completion of this course student will be able to
2. Students will learn concepts related to embedded C programming.
3. Students will be able to write and execute embedded C program to perform array addition, block transfer, sorting operations
4. Students will be able to learn interfacing of real world input and output devices to PIC18FXXX microcontroller.
5. Students will learn open source prototype platform like Raspberry-Pi/Beagle board/Arduino.

Subject Code &Name – 214456 Database Management System LAB

Course Objectives

1. Understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
2. To provide a strong formal foundation in database concepts, recent technologies and best industry practices.
3. To give systematic database design approaches covering conceptual design, logical design and an overview of physical design.
4. To learn the SQL database system.
5. To learn and understand various Database Architectures and its use for application development.
6. To programme PL/SQL including stored procedures, stored functions, cursors and packages.

Course Outcomes

On completion of the course, learner will be able to

1. To install and configure database systems.
2. To analyze database models & entity relationship models.
3. To design and implement a database schema for a given problem-domain
4. To understand the relational database systems.
5. To populate and query a database using SQL DDL / DML / DCL commands.
6. To design a backend database of any one organization: CASE STUDY

Subject Code &Name – 214457 Computer Graphics Lab

Course Objectives

1. To acquaint the learners with the concepts of OpenGL
2. To acquaint the learners with the basic concepts of Computer Graphics
3. To implement the various algorithms for generating and rendering the objects
4. To get familiar with mathematics behind the transformations
5. To understand and apply various methods and techniques regarding animation

Course Outcomes

On completion of the course, learner will be able to

1. Apply and implement line drawing and circle drawing algorithms to draw the objects.
2. Apply and implement polygon filling methods for the object
3. Apply and implement polygon clipping algorithms for the object
4. Apply and implement the 2D transformations on the object
5. Implement the curve generation algorithms
6. Demonstrate the animation of any object using animation principles

Subject Code &Name – 214458 Project Based Learning

Course Objectives

After completing PBL course, the student will be able to:

1. Know about project and project based learning
 - a. Experience the concept of learning by doing,
 - b. Experience advanced and efficient learning model
2. Understand the various processes involved in project based learning and the importance of team work in project based learning
 - a. develop projects for various real life situations
 - b. work in realistic contextualized problem-solving environments
 - c. realize the success of a project by experiencing the desired output
3. Apply knowledge and understanding of project based learning processes in new situations
 - a. improve communication skills
 - b. enhance self-confidence
 - c. build up teamwork and leadership skills

Course Outcomes

On completion of the course, learner will be able to

1. Students will gain knowledge of how to provide solution to real life problems and analyze its concerns through shared cognition.
2. Students will be able to understand concepts of various disciplines and apply them in practical way.
3. Learning by doing approach in PBL will promote long-term retention of material and replicable skill.
4. Becoming well prepared for the labor market.
5. Student will motivate to collaborate with external partners and engage in interdisciplinary learning environments

Subject Code &Name - 214459 Mandatory Audit Course -4B: Language Study Japanese: Module-II

Course Objectives

1. To develop the Japanese communicative competence of students with small sentence formation to make primitive social conversation in Japanese
2. To enable students with comprehension ability of Japanese grammar
3. To enable students to translate simple conversations from English to Japanese and vice a versa
4. To make students aware about Japanese Culture and Customs

Course Outcomes

On completion of the course, learner will be able to-

1. Have Japanese Communicative competence for primitive Social conversation in Japanese
2. Comprehend Grammar of Japanese Script
3. Translate simple sentences from Japanese to English and vice a versa
4. Be aware about Japanese society and people



CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Second Year Mechanical Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name -202041 - Solid Mechanics

Course Objectives

1. To acquire basic knowledge of stress, strain due to various types of loading.
2. To draw Shear Force and Bending Moment Diagram for transverse loading.
3. To determine Bending, Shear stress, Slope and Deflection on Beam.
4. To solve problems of Torsional shear stress for shaft and Buckling for the column.
5. To apply the concept of Principal Stresses and Theories of Failure.
6. To utilize the concepts of Solid Mechanics on application based combined mode of loading

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE various types of stresses and strain developed on determinate and indeterminate members.
2. DRAW Shear force and bending moment diagram for various types of transverse loading and support.
3. COMPUTE the slope & deflection, bending stresses and shear stresses on a beam.
4. CALCULATE torsional shear stress in shaft and buckling on the column.
5. APPLY the concept of principal stresses and theories of failure to determine stresses on a 2-D element.
6. UTILIZE the concepts of SFD & BMD, torsion and principal stresses to solve combined loading application based problems.

Subject Code & Name -202042 - Solid Modeling and Drafting

Course Objectives

1. To understand basic structure of CAD systems and their use to create geometric models of simple engineering parts
2. To introduce the curves and surfaces and their implement in geometric modeling
3. To apply basic concepts of 3D modeling, viewing and evaluate mass properties of components and assemblies
4. To apply geometrical transformations in CAD models

5. To understand data exchange standards and translators for various applications
6. To create engineering drawings, design documentation and use in manufacturing activities

Course Outcomes

On completion of the course, learner will be able to

1. UNDERSTAND basic concepts of CAD system, need and scope in Product Lifecycle Management
2. UTILIZE knowledge of curves and surfacing features and methods to create complex solid geometry
3. CONSTRUCT solid models, assemblies using various modeling techniques & PERFORM mass property analysis, including creating and using a coordinate system
4. APPLY geometric transformations to simple 2D geometries
5. USE CAD model data for various CAD based engineering applications viz. production drawings, 3D printing, FEA, CFD, MBD, CAE, CAM, etc.
6. CO6. USE PMI & MBD approach for communication

Subject Code &Name -202043 - Engineering Thermodynamics

Course Objectives

1. To introduce the fundamentals of thermodynamics.
2. To understand the concepts of laws of thermodynamics.
3. To apply the concepts of thermodynamics towards open and closed systems.
4. To be acquainted with Entropy generation and Exergy Analysis.
5. To understand the behaviour of a Pure substance and to analyze Vapour power cycles.
6. To undertake the performance analysis of a steam generator.

Course Outcomes

Describe the basics of thermodynamics with heat and work interactions.

1. APPLY laws of thermodynamics to steady flow and non-flow processes.
2. APPLY entropy, available and non available energy for an Open and Closed System,
3. DETERMINE the properties of steam and their effect on performance of vapour power cycle.
4. ANALYSE the fuel combustion process and products of combustion.
5. SELECT various instrumentations required for safe and efficient operation of steam generator.

Subject Code &Name -202044 - Engineering Materials &Metallurgy

Course Objectives

1. To impart fundamental knowledge of material science and engineering.
2. To establish significance of structure property relationship.

3. To explain various characterization techniques.
4. To indicate the importance of heat treatment on structure and properties of materials.
5. To explain the material selection process.

Course Outcomes

On completion of the course, learner will be able to

1. COMPARE crystal structures and ASSESS different lattice parameters.
2. CORRELATE crystal structures and imperfections in crystals with mechanical behaviour of materials.
3. DIFFERENTIATE and DETERMINE mechanical properties using destructive and non-destructive testing of materials.
4. IDENTIFY & ESTIMATE different parameters of the system viz., phases, variables, component, grains, grain boundary, and degree of freedom. etc.
5. ANALYSE effect of alloying element & heat treatment on properties of ferrous & nonferrous alloy.
6. SELECT appropriate materials for various applications.

Subject Code & Name - 203156 Electrical & Electronics Engineering

Course Objectives

1. To understand Arduino IDE; an open source platform and its basic programming features.
2. To interface Atmega328 based Arduino board with different devices and sensors
3. To study principle of operation of DC machines and speed control of DC motors
4. To know about three phase induction motor working and its applications
5. To get acquainted with Electric Vehicle (EV) technology and subsystems
6. To get familiar with various energy storage devices and electrical drives

Course Outcomes

1. On completion of the course, learner will be able to
2. APPLY programming concepts to UNDERSTAND role of Microprocessor and Microcontroller in embedded systems
3. DEVELOP interfacing of different types of sensors and other hardware devices with Atmega328 based Arduino Board
4. UNDERSTAND the operation of DC motor, its speed control methods and braking
5. DISTINGUISH between types of three phase induction motor and its characteristic features

6. EXPLAIN about emerging technology of Electric Vehicle (EV) and its modular subsystems
7. CHOOSE energy storage devices and electrical drives for EVs

Subject Code &Name -202045 Geometric Dimensioning and Tolerancing Lab

Course Objectives

1. To understand requirements of industrial drawings
2. To read, understand and explain basic Geometric Dimensioning & Tolerancing concepts
3. To apply various geometric and dimension tolerances based on type of fit
4. To include surface roughness symbols based on manufacturing process
5. To measure and verify position tolerances with applied material conditions
6. To understand requirements for manufacturing and assembly

Course Outcomes

On completion of the course, learner will be able to

1. SELECT appropriate IS and ASME standards for drawing
2. READ & ANALYSE variety of industrial drawings
3. APPLY geometric and dimensional tolerance, surface finish symbols in drawing
4. EVALUATE dimensional tolerance based on type of fit, etc.
5. SELECT an appropriate manufacturing process using DFM, DFA, etc.

SEM II

Subject Code &Name -207002 - Engineering Mathematics - III

Course Objectives

1. To make the students familiarize with concepts and techniques in Ordinary & Partial differential equations, Laplace transform & Fourier transform, Statistical methods, Probability theory and Vector calculus.
2. The aim is to equip them with the techniques to understand advanced level mathematics and its applications that would enhance analytical thinking power, useful in their disciplines.

Course Outcomes

On completion of the course, learner will be able to

1. SOLVE higher order linear differential equations and its applications to model and analyze mass spring systems.
2. APPLY Integral transform techniques such as Laplace transform and Fourier transform to solve differential equations involved in vibration theory, heat transfer and related mechanical engineering applications.
3. APPLY Statistical methods like correlation, regression in analyzing and interpreting experimental data applicable to reliability engineering and probability theory in testing and quality control.
4. PERFORM Vector differentiation & integration, analyze the vector fields and APPLY to fluid flow problems.
5. SOLVE Partial differential equations such as wave equation, one and two dimensional heat flow equations.

Subject Code &Name -202047 - Kinematics of Machinery

Course Objectives

1. To make the students conversant with kinematic analysis of mechanisms applied to real life and industrial applications.
2. To develop the competency to analyze the velocity and acceleration in mechanisms using analytical and graphical approach.
3. To develop the skill to propose and synthesize th mechanisms using graphical and analytical technique.
4. To develop the competency to understand & apply the principles of gear theory to design various applications.
5. To develop the competency to design a cam profile for various follower motions.

Course Outcomes

On completion of the course, learner will be able to

1. APPLY kinematic analysis to simple mechanisms
2. ANALYZE velocity and acceleration in mechanisms by vector and graphical method
3. SYNTHESIZE a four bar mechanism with analytical and graphical methods
4. APPLY fundamentals of gear theory as a prerequisite for gear design
5. CONSTRUCT cam profile for given follower motion

Subject Code & Name -202048 - Applied Thermodynamics

Course Objectives

1. To determine COP of refrigeration cycle and study Psychrometric properties and processes.
2. To study working of engine, Actual, Fuel-Air and Air standard cycle and its Performance.
3. To understand Combustion in SI and CI engines and factors affecting performance parameters
4. To study emission from IC Engines and its controlling method, various emission norms.
5. To estimate performance parameters by conducting a test on I. C. Engines.
6. To determine performance parameters of Positive displacement compressor.

Course Outcomes

On completion of the course, learner will be able to

1. DETERMINE COP of refrigeration system and ANALYZE psychometric processes.
2. DISCUSS basics of engine terminology, air standard, fuel air and actual cycles.
3. IDENTIFY factors affecting the combustion performance of SI and CI engines.
4. DETERMINE performance parameters of IC Engines and emission control
5. EXPLAIN working of various IC Engine systems and use of alternative fuels.
6. CALCULATE performance of single and multi stage reciprocating compressors and DISCUSS rotary positive displacement compressors his/her own words.

Subject Code &Name -202049 - Fluid Mechanics

Course Objectives

1. To understand basic properties of fluids.
2. To learn fluid statics and dynamics
3. To study basics of flow visualization
4. To understand Bernoulli's theorem and its applications.
5. To understand losses in flow, drag and lift forces

6. To learn to establish relation between flow parameters.

Course Outcomes

On completion of the course, learner will be able to

1. DETERMINE various properties of fluid
2. APPLY the laws of fluid statics and concepts of buoyancy
3. IDENTIFY types of fluid flow and terms associated in fluid kinematics
4. APPLY principles of fluid dynamics to laminar flow
5. ESTIMATE friction and minor losses in internal flows and DETERMINE boundary layer formation over an external surface
6. CONSTRUCT mathematical correlation considering dimensionless parameters, also
7. ABLE to predict the performance of prototype using model laws

Subject Code & Name -202050 - Manufacturing Processes

Course Objectives

1. Describe various sand and permanent mould casting methods, procedure and mould design aspects.
2. Understand basics of metal forming processes, equipment and tooling.
3. Understand sheet metal forming operations and die design procedure.
4. Classify, describe and configure the principles of various welding techniques.
5. Understand plastic processing techniques.
6. To know about composites, its fabrication processes.

Course Outcomes

On completion of the course, learner will be able to

1. SELECT appropriate moulding, core making and melting practice and estimate pouring time, solidification rate and DESIGN riser size and location for sand casting process
2. UNDERSTAND mechanism of metal forming techniques and CALCULATE load required for flat rolling
3. DEMONSTRATE press working operations and APPLY the basic principles to DESIGN dies and tools for forming and shearing operations
4. CLASSIFY and EXPLAIN different welding processes and EVALUATE welding characteristics
5. DIFFERENTIATE thermoplastics and thermosetting and EXPLAIN polymer processing techniques

6. UNDERSTAND the principle of manufacturing of fibre-reinforce composites and metal matrix composites

Subject Code &Name -202051 - Machine Shop

Course Objectives

1. To understand the basic procedures, types of equipment, tooling used for sand casting and metal forming processes through demonstrations and/(or) Industry visits..
2. To understand TIG/ MIG/ Resistance/Gas welding welding techniques.
3. To acquire skills to handle grinding and milling machine and to produce gear by milling.
4. To acquire skills to produce a composite part by manual process.

Course Outcomes

On completion of the course, learner will be able to

1. PERFORM welding using TIG/ MIG/ Resistance/Gas welding technique
2. MAKE Fibre-reinforced Composites by hand lay-up process or spray lay-up techniques
3. PERFORM cylindrical/surface grinding operation and CALCULATE its machining time
4. CO4. DETERMINE number of indexing movements required and acquire skills to PRODUCE a spur gear on a horizontal milling machine
5. CO5. PREPARE industry visit report
6. CO6. UNDERSTAND procedure of plastic processing

Subject Code &Name -202052 - Project Based Learning - II

Course Objectives

1. To emphasize project based learning activities that are long-term, interdisciplinary and student-centric.
2. To inculcate independent and group learning by solving real world problems with the help of available resources.
3. To be able to develop applications based on the fundamentals of mechanical engineering by possibly applying previously acquired knowledge.
4. To get practical experience in all steps in the life cycle of the development of mechanical systems: specification, design, implementation, and testing.
5. To be able to select and utilize appropriate concepts of mechanical engineering to design and analyze selected mechanical system.

Course Outcomes

On completion of the course, learner will be able to

1. IDENTIFY the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aims and objectives.
2. ANALYZE the results and arrive at valid conclusions.
3. PROPOSE a suitable solution based on the fundamentals of mechanical engineering by possibly integration of previously acquired knowledge.
4. CONTRIBUTE to society through proposed solutions by strictly following professional ethics and safety measures.
5. 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.

CAYMET's



Siddhant College of Engineering

SavitribaiPhule Pune University, Pune

Third Year Civil Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name -301001: Hydrology and Water Resource Engineering

Course objectives

1. To introduce students to different government organizations and make them aware about precipitation, runoff, runoff hydrographs and streams gauging.
2. To introduce the concept of reservoir planning, capacity of reservoir, economics of reservoir, floods, hydrologic routing and use of Q-GIS software in hydrology.
3. To impart knowledge of irrigation, crop water requirement, canal distribution network, piped distribution network, revenue collection, ground water hydrology, water logging, and drainage and water management.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand government organizations, apply & analyze precipitation & its abstractions.
2. Understand, apply & analyze runoff, runoff hydrographs and gauging of streams.
3. Understand, apply & analyze floods, hydrologic routing & Q-GIS software in hydrology.
4. Understand, apply & analyze reservoir planning, capacity of reservoir & reservoir economics.
5. Understand water logging & water management, apply & analyze ground water hydrology
6. Understand irrigation, piped distribution network and canal revenue, apply and analyze crop water requirement.

Subject Code & Name -301002: Water Supply Engineering

Course objectives

1. To make students understand importance of water infrastructure with respect to needs of various users.
2. To discuss and demonstrate the principles of water treatment plant and layout.
3. To inculcate and impart design principles and working of WTP components
4. To interpret need of contemporary issues in water treatment.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Define identify, describe reliability of water sources, estimate water requirement for various sectors
2. Ascertain and interpret water treatment method required to be adopted with respect to source and raw water characteristics
3. Design various components of water treatment plant and distribution system.
4. Understand and compare contemporary issues and advanced treatment operations and process available in the market, including packaged water treatment plants.
5. Design elevated service reservoir capacity and understand the rainwater harvesting.
6. Understand the requirement of water treatment plant for infrastructure and Government scheme.

Subject Code & Name -301003: Design of Steel Structures

Course objectives

1. This course is designed to provide understanding of IS code provisions, fundamentals of structural steel design and its applications for design of various components.
2. Students should be able to understand components of steel structures and its arrangements

3. Student should be able to design beams, columns, column footings, roof trusses, gantry girder and plate girders

Course outcomes

On successful completion of this course, the learner will be able to:

1. Demonstrate knowledge about the types of steel structures, steel code provisions and design of the adequate steel section subjected to tensile force.
2. Determine the adequate steel section subjected to compression load and design of built up columns along with lacing and battening.
3. Design eccentrically loaded column for section strength and column bases for axial load and uniaxial bending.
4. Design of laterally restrained and unrestrained beam with and without flange plate using rolled steel section.
5. Analyze the industrial truss for dead, live and wind load and design of gantry girder for moving load.
6. Understand the role of components of welded plate girder and design cross section for welded plate girder including stiffeners and its connections.

Subject Code & Name -301004: Engineering Economics and Financial Management

Course objectives

1. To apply the knowledge of accounting and financial management in civil engineering projects.
2. To prepare, appraise, evaluate, and approve financial plans and interpret financial data.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand basics of construction economics.
2. Develop an understanding of financial management in civil engineering projects.
3. Prepare and analyze the contract account.
4. Decide on right source of fund for construction projects.
5. Understand working capital and its estimation for civil engineering projects.
6. Illustrate the importance of tax planning & understand role of financial regulatory bodies.

Subject Code & Name-301005 a: Elective I: Advanced Fluid Mechanics and Hydraulic Machines

Course objectives

1. To study flow over notches and weirs; and the concept of hydraulic jump and losses
2. To state the importance of ideal fluid flow analysis.
3. To study laminar flow between parallel plates.
4. To study unsteady flow through orifice and the concept of water hammer in pipe flow
5. To study impact of free jet on stationary and moving flat and curved vanes
6. To study Pelton wheel, Francis turbine and centrifugal pump from view point of their working principle, work done, efficiency and performance characteristics.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Determine discharge using notches and weirs, and energy loss in hydraulic jump in open channel flow.
2. Describe simple superpositions of basic ideal fluid flows; and determine velocity and shear stress distribution for laminar flow between parallel plates.
3. Understand flow through openings under varying head, and determine rise in pressure due to water hammer effect in pipe flow.
4. Calculate force exerted by free jet on stationary and moving, flat and curved vanes using impulse momentum principle.
5. Design Pelton wheel and Francis turbines and predict their performance characteristics.
6. Estimate performance characteristics of Centrifugal pump

Subject Code &Name -301005 b: Elective I: Research Methodology and IPR

Course Objectives

1. The course has been developed with orientation towards research related activities and recognizing the ensuing knowledge as property.
2. It will create consciousness of research methodology, which will be useful to develop a research culture in the young minds.
3. Learners will be able to perform documentation and administrative procedures relating to IPR in India as well as abroad

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand a research problem for civil engineering domain.
2. Analyze the available literature for given research problem and illustrate different techniques of literature survey thereby gap identification.
3. Recognize the importance of data collection and investigate the statistical and reliability methods of preliminary data analysis.
4. Explain the important concept of interpretation and develop technical writing and presentation skills.
5. Comprehend the various forms of the intellectual property, its relevance and business impact in the changing global business environment.
6. Realize the importance of patents, trademark and copyright and follow research ethic

Subject Code &Name 301005 c: Elective I: Construction Management

Course Objectives

1. To understand various construction activities and evaluating construction projects.
2. To handle all situations with knowledge of various labour laws and financial aspects of construction projects.
3. To know about risk management and value engineering
4. To utilize material and human resources efficiently with managerial skills interpersonal and intrapersonal skills.
5. To apply knowledge of artificial intelligence on construction project

Course Outcomes

On successful completion of this course, the learner will be able to:

1. Understand the overview of construction sector.
2. Illustrate construction scheduling, work study and work measurement.
3. Acquaint various labor laws and financial aspects of construction projects.
4. Explain elements of risk management and value engineering.
5. State material and human resource management techniques in construction.
6. Understand basics of artificial intelligence techniques in civil engineering.

Subject Code &Name-301005 d: Elective I: Advanced Concrete Technology

Course objectives

1. To provide an advanced understanding on cement chemistry, influence of supplementary cementitious materials, and effect of admixtures on properties of concrete
2. To illustrate the role of fibers and understand the durability properties of concrete
3. To study advanced testing methods on concrete

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand the chemistry of cement and its effect on properties of concrete
2. Apply the knowledge of supplementary cementitious materials to produce sustainable concretes
3. Understand the mechanism of working of admixtures and their effect on properties of concrete
4. Evaluate the characteristic properties of fiber reinforced concrete
5. Understand the durability properties of concrete
6. Interpret the properties of concrete through advance testing methods

Subject Code &Name -301005 e: Elective I: Matrix Methods of Structural Analysis

Course objectives

1. To understand the structural behavior of beams, plane frames by analyzing using flexibility method of analysis.
2. To generate element/member stiffness matrix, transformation matrix and global/structure stiffness matrix for the skeletal structures and analyze the structure using stiffness method.
3. To develop program algorithm/flowcharts applying the concepts of member approach of stiffness method to analyze skeletal structures and forming base for the study of Finite element method

Course outcomes

On successful completion of this course, the learner will be able to:

1. To understand the structural behavior of bars and trusses and analyze it by using flexibility method of analysis.
2. To understand the structural behavior of beams and plane frames and analyze it by using flexibility method of analysis.
3. To analyze bars, springs and truss by member approach of stiffness matrix method.
4. To analyze beams by member approach of stiffness matrix method and to develop transformation matrix and global/structure stiffness matrix for plane frame and thereby analyze it by member approach of stiffness matrix method.
5. To develop transformation matrix and global/structure stiffness matrix for grid and analyze the grid by structure and member approach of stiffness matrix method.
6. To develop the member stiffness matrix of space truss and space frame and develop the flow chart /algorithm to write the program for analysis of skeletal structures with reference to computer application

Subject Code &Name -301005 f: Elective I: Advanced Mechanics of Structures

Course objectives

1. To learn the concept of moment area and conjugate beam method to find slope and deflection
2. To study different type of stresses in thin and thick cylindrical shells
3. To learn application of influence line diagram to find the forces in the members due to moving load
4. To study the analysis of beams and arches

Course outcomes

On successful completion of this course, the learner will be able to:

1. Apply moment area and conjugate method to find slope and deflection.
2. Evaluate stresses and strain in thin and thick cylinder.
3. Analyze the beam and trusses by influence line diagram.
4. Analyze the beam for moving load by influence line diagram.
5. Understand and analyze beam curved in plan and elevation.
6. Analyze three and two hinged arches for axial thrust, shear and moment

Subject Code &Name -301006: Seminar

Course objectives

1. Identify technical / practical problems in the field of civil engineering.
2. Inculcate the ability to describe, interpret and analyze technical content.
3. Develop competence in preparing report which will enhance critical thinking and develop the skill of technical writing along with presentation.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Appraise the current civil engineering research / techniques / developments / interdisciplinary areas.
2. Review and organize literature survey utilizing technical resources, journals etc.
3. Evaluate and draw conclusions related to technical content studied.
4. Demonstrate the ability to perform critical writing by preparing a technical report.
5. Develop technical writing and presentation skills.

Subject Code &Name-301011 a: Audit Course I: Professional Ethics and Etiquettes

Course objectives

1. To create awareness on professional ethics and human values.
2. To provide basic familiarity about Engineers as responsible experimenters, research ethics, codes of ethics, industrial standards.
3. To inculcate knowledge and exposure on safety and risk.
4. To expose students to right attitudinal and behavioral aspects.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand the basic perception of profession, professional ethics, various moral issues and uses of ethical theories
2. Understand various social issues, industrial standards, code o ethics and role of professional ethics in engineering field.
3. Follow ethics as an engineering professional and adopt good standards and norms of engineering practice.
4. Apply ethical principles to resolve situations that arise in their professional lives

Subject Code &Name-301011 b: Audit Course I: Sustainable Energy Systems

Course objectives

1. To understand the impact of engineering solutions on a global, economic, environmental and societal context.
2. To design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

Course outcomes

On successful completion of this course, the learner will be able to:

1. To demonstrate an overview of the main sources of renewable energy.
2. To understand benefits of renewable and sustainable energy systems.

SEM-II

Subject Code &Name -301012: Waste Water Engineering

Course objectives

1. To introduce students about the need of sanitation infrastructure, wastewater treatment, sludge management system and to identify potential of wastewater for recycle and reuse
2. To inculcate an ability to learn the working principle, operation and design of various units of wastewater treatment plant

Course outcomes

On successful completion of this course, the learner will be able to:

1. Recall sanitation infrastructure, quantification and characterization of wastewater, natural purification of streams
2. Design preliminary and primary unit operations in waste water treatment plant
3. Understand theory and mechanism of aerobic biological treatment system and to design activated sludge process
4. Understand and design suspended and attached growth wastewater treatment systems
5. Explain and apply concept of contaminant removal by anaerobic, tertiary and emerging wastewater treatment systems
6. Compare various sludge management systems and explain the potential of recycle and reuse of wastewater treatment

Subject Code &Name -301013: Design of Reinforced Concrete Structures

Course objectives

- 1 To provide the students with basic concepts of reinforced concrete structures.
- 2 To analyze, design and detailing of different component of reinforced concrete structures.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Apply relevant IS provisions to ensure safety and serviceability of structures, understand the design philosophies and behavior of materials: steel & concrete.
2. Recognize mode of failure as per LSM and evaluate moment of resistance for singly, doubly rectangular, and flanged sections.
3. Design & detailing of rectangular one way and two-way slab with different boundary conditions
4. Design & detailing of dog legged and open well staircase
5. Design & detailing of singly/doubly rectangular/flanged beams for flexure, shear, bond and torsion.
6. Design & detailing of short columns subjected to axial load, uni-axial/bi-axial bending and their footings.

Subject Code &Name -301014: Remote Sensing and Geographic Information System

Course objectives

1. To comprehend fundamentals and principles of RS and GIS techniques.
2. To enhance students' capacity to interpret images and extract information of earth surface from multi-resolution imagery at multi-scale level.
3. To develop skills of Image processing and GIS
4. To utilize RS and GIS techniques in Engineering Geology and civil engineering.
5. To study satellite image processing, satellite image interpretation, digitization and generation of thematic maps in a GIS.
6. To learn buffering and layer analysis for civil engineering applications.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Articulate fundamentals and principles of RS techniques.
2. Demonstrate the knowledge of remote sensing and sensor characteristics.
3. Distinguish working of various spaces-based positioning systems.
4. Analyze the RS data and image processing to utilize in civil engineering
5. Explain fundamentals and applications of RS and GIS

6. Acquire skills of data processing and its applications using GIS

Subject Code &Name -301015 a: Elective II: Advanced Engineering Geology with Rock Mechanics

Course objectives

1. To apply geological principles in various phases of civil engineering projects.
2. To develop ability to carry out independently civil engineering and geological investigations.
3. To choose and compare the site conditions leading to their suitability and to treat geological defects to achieve the economy.
4. To highlight geophysical explorations and their applications in geology.
5. To understand fundamentals of rock mechanics and application part of units.
6. To assess the methods required for geological investigations for tunnels, bridges, and dams.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Illustrate seismic zones, plate tectonics and civil engineering significance of major rock formations of India with their characteristics.
2. Explain soil profile, geo-hydrological characters of various rock formations and necessity of geological studies in water conservation.
3. Apply knowledge of geology in Infrastructural, Urban development and demonstrate importance of national wealth.
4. Validate the suitability of rocks based on mechanical properties, R.Q.D. and geophysical exploration.
5. Explore subsurface Geology for civil engineering projects to suggest foundation treatments for various geological defects and channel erosion.
6. Illustrate the suitability of proposed alignments for tunnels and bridges on the basis of Geological investigations

Subject Code &Name -301015 b: Elective II: Soft Computing Techniques

Course objectives

1. To make students aware about soft computing techniques
2. To impart knowledge about components and training of ANN
3. To introduce students to important aspects of neural network design
4. To introduce students to neural network types and its application
5. To impart knowledge about working of genetic algorithms and Support vector regressions along with their applications
6. To impart knowledge about working of model tree and random forest along with their applications

Course outcomes

On successful completion of this course, the learner will be able to:

1. Understand AI techniques, soft computing techniques and basic concepts Artificial Neural Network
2. Understand components of ANN, training algorithms and implement the back propagation algorithm
3. Design the feed forward back propagation neural network.
4. Understand types of neural networks and their applications
5. Understand working of genetic algorithm, support vector regressions, model tree and random forest along with their applications
6. Develop models for time series applications using support vector regressions, model tree and random forest

Subject Code &Name -301015 c: Elective II: Advanced Surveying

Course objectives

1. To understand the advance surveying techniques and instruments.
2. To interpret the advanced surveying measurements.
3. To execute the ground as well as aerial mapping.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Recognize the concept of triangulation for fixing the ground control points.
2. Differentiate most probable values for different measurement and adjust those in a given figure.
3. Summarize the concepts of astronomical and hydrographic surveying.
4. Demonstrate the use of aerial photographs for mapping.
5. Analyze use of modern surveying instruments in the field.
6. Execute GPS and the associated software for different applications in civil engineering.

Subject Code &Name -301015 d: Elective II: Advanced Geotechnical Engineering

Course objectives

1. To learn the classification of soil, soil structure, role of water in clay, earth pressure on retaining structures and the design of retaining structures.
2. To study types of triaxial tests and draw the stress paths.
3. To know methods to implement soil stabilization and different ground improvement techniques

Course outcomes

On successful completion of this course, the learner will be able to:

1. Classify the soil and understand the soil structure and role of water in clay.
2. Calculate lateral pressure on retaining structures and carry out design the retaining structures.
3. Interpret the results of triaxial tests under different drainage conditions.
4. Draw the stress paths for different conditions.
5. Select and implement soil stabilization techniques based on field conditions.
6. Explain different ground improvement techniques.

Subject Code &Name -301015 e: Elective II: Architecture and Town Planning

Course objectives

1. To use principles of architectural planning and understand futuristic need of users.
2. To discuss and demonstrate the concepts of landscaping, urban renewal and sustainable architecture
3. To distinguish and relate planning levels and understand use of act and to develop neighborhood plan
4. To interpret need of civic surveys for DP proposal and value planning agencies and ITS
5. To understand and demonstrate planning strategy with reference to different acts, guidelines, norms.
6. To appraise multifaceted zones like SEZ, CRZ and Special township, understand applications of modern Tools like GIS / GPS / RS in town planning and need of Rural Planning

Course outcomes

On successful completion of this course, the learner will be able to:

1. Apply the principles of architectural planning and landscaping for improving quality of life
2. Understand the confronting issues of the area and apply the acts.
3. Evaluate and defend the proposals.
4. Appraise the existing condition and to develop the area for betterment

Subject Code &Name -301015 f: Elective II: Solid Waste Management

Course objectives

1. To understand problems of solid waste, estimate and characterize the solid waste and apply the knowledge of laws for municipal solid waste management for handling of MSW.
2. To understand government initiatives for management of solid waste, to apply the knowledge of mathematics, science, and engineering for effective solid waste collection systems, for waste collection route optimization and its economics.
3. To understand processing of solid waste, material recovery facility and to design composting systems, maintain and operate composting process for effective organic waste recycling.
4. To understand working of waste to energy system and to design of bio-methnation and incineration system.
5. To design & manage construction and operations of landfill facilities and management of legacy solid waste.
6. To understand management and legal requirements of special waste and reuse, recycle and material recovery from solid waste.

Course outcomes

On successful completion of this course, the learner will be able to:

1. Outline solid waste management systems with respect to its generation rate (quantity), sampling, characteristics and regulatory/legal requirements.
2. Explain and suggest relevant method of storage, collection and transportation of solid waste for the given site condition with justification.
3. Develop understanding of technological applications for processing and material recovery from solid waste with its economics and design composting system for organic waste.
4. Describe the fundamental and technological aspects of waste to energy systems from solid waste and to design anaerobic digester and incineration system.
5. Outline the design, operation, and maintenance of sanitary landfill and management of legacy waste.
6. 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

Subject Code &Name -301016: Internship**Course objectives**

1. To encourage and provide opportunities for students to get professional/personal experience through internships.
2. To learn to apply the technical knowledge gained from academics /classroom learning in real life/industrial situations.
3. To get familiar with various tools and technologies used in industries and their applications.
4. To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. To apply the experience gained from industrial internship to the academic course completion project.
6. To nurture professional and societal ethics in students
7. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations

Course outcomes

On successful completion of this course, the learner will be able to:

1. To develop professional competence through industry internship
2. To apply academic knowledge in a personal and professional environment
3. To build the professional network and expose students to future employees
4. Apply professional and societal ethics in their day to day life
5. To become a responsible professional having social, economic and administrative considerations
6. To make own career goals and personal aspiration.

CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Third Year Computer Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name - 310241: Database Management Systems

Course Objectives

1. To understand the fundamental concepts of Database Management Systems
2. To acquire the knowledge of database query languages and transaction processing
3. To understand systematic database design approaches
4. To acquire the skills to use a powerful, flexible, and scalable general-purpose databases to handle Big Data
5. To be familiar with advances in databases and applications

Course Outcomes

On completion of the course, learners should be able to

1. Analyze and design Database Management System using ER model
2. Implement database queries using database languages
3. Normalize the database design using normal forms
4. Apply Transaction Management concepts in real-time situations
5. Use NoSQL databases for processing unstructured data
6. Differentiate between Complex Data Types and analyze the use of appropriate data types

Subject Code & Name - 310242: Theory of Computation

Course Objectives

1. To introduce the students to basics of Theory of Computation
2. To study abstract computing models to provide a formal connection between algorithmic problem solving and the theory of languages
3. To understand Grammar, Pushdown Automata and Turing Machine for language processing and algorithm design
4. To learn about the theory of computability and complexity for algorithm design

Course Outcomes

After completion of the course, learners should be able to

1. Understand formal language, translation logic, essentials of translation, alphabets, language representation and apply it to design Finite Automata and its variants
2. Construct regular expression to present regular language and understand pumping lemma for RE
3. Design Context Free Grammars and learn to simplify the grammar
4. Construct Pushdown Automaton model for the Context Free Language
5. Devise Turing Machine for the different requirements outlined by theoretical computer science
6. Analyze different classes of problems, and study concepts of NP completeness

Subject Code & Name - 310243: Systems Programming and Operating System

Course Objectives

1. To get acquainted with the basics of System Programming
2. To acquire knowledge of data structures used in the design of System Software
3. To be familiar with the format of object modules, the functions of linking, relocation, and loading
4. To comprehend the structures and functions of Operating Systems and process management.

5. To deal with concurrency and deadlock in the Operating System
6. To learn and understand memory management of Operating System

Course Outcomes

On completion of the course, learners should be able to

1. Analyze and synthesize basic System Software and its functionality.
2. Identify suitable data structures and Design & Implement various System Software
3. Compare different loading schemes and analyze the performance of linker and loader
4. Implement and Analyze the performance of process scheduling algorithms
5. Identify the mechanism to deal with deadlock and concurrency issues
6. Demonstrate memory organization and memory management policies

Subject Code &Name - 310244: Computer Networks and Security

Course Objectives

1. To understand the fundamental concepts of networking standards, protocols and technologies
2. To learn different techniques for framing, error control, flow control and routing
3. To learn different layer protocols in the protocol stacks
4. To understand modern network architectures with respect to design and performance
5. To learn the fundamental concepts of Network Security

Course Outcomes

On completion of the course, learners should be able to

1. Summarize fundamental concepts of Computer Networks, architectures, protocols and technologies
2. Illustrate the working and functions of data link layer
3. Analyze the working of different routing protocols and mechanisms
4. Implement client-server applications using sockets
5. Illustrate role of application layer with its protocols, client-server architectures
6. Comprehend the basics of Network Security

Subject Code &Name- 310245(A): Internet of Things and Embedded Systems

Course Objectives

1. To understand fundamentals of Internet of Things (IoT) and Embedded Systems
2. To learn advances in Embedded Systems and IoT
3. To learn methodologies for IoT application development
4. To learn the IoT protocols, cloud platforms and security issues in IoT
5. To learn real world application scenarios of IoT along with its societal and economic impact using case studies and real time examples

Course Outcomes

On completion of the course, learners should be able to

1. Understand the fundamentals and need of Embedded Systems for the Internet of Things
2. Apply IoT enabling technologies for developing IoT systems
3. Apply design methodology for designing and implementing IoT applications
4. Analyze IoT protocols for making IoT devices communication
5. Design cloud based IoT systems
6. Design and Develop secured IoT applications

Subject Code &Name - 310245(B): Human Computer Interface

Course Objectives

1. To understand the importance of HCI design process in software development
2. To learn fundamental aspects of designing and implementing user interfaces
3. To study HCI with technical, cognitive and functional perspectives
4. To acquire knowledge about variety of effective human-computer-interactions

5. To co-evaluate the technology with respect to adapting changing user requirements in interacting with computer.

Course Outcomes

On completion of the course, learners should be able to

1. Design effective Human-Computer-Interfaces for all kinds of users
2. Apply and analyze the user-interface with respect to golden rules of interface
3. Analyze and evaluate the effectiveness of a user-interface design
4. Implement the interactive designs for feasible data search and retrieval
5. Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual reality ,multi-media, World wide web related environments
6. Analyze and identify user models, user support, and stakeholder requirements of HCI systems

Subject Code &Name - 310245(C): Distributed Systems

Course Objectives

1. To learn the fundamentals of Distributed Systems
2. To learn types of communication and synchronization in Distributed Systems
3. To acquaint with the Distributed File Systems
4. To understand consistency and replication in Distributed Systems
5. To understand the fault tolerance based Distributed Systems

Course Outcomes

On completion of the course, learners should be able to

1. Analyze Distributed Systems types and architectural styles
2. Implement communication mechanism in Distributed Systems
3. Implement the synchronization algorithms in Distributed System applications
4. Develop the components of Distributed File System
5. Apply replication techniques and consistency model in Distributed Systems
6. Build fault tolerant Distributed Systems

Subject Code &Name - 310245(D): Software Project Management

Course Objectives

1. To understand the fundamentals of Software Project Management
2. To investigate software project planning and management tools
3. To learn software project scheduling and tracking
4. To discuss about the agile project management
5. To know people management in software project

Course Outcomes

On completion of the course, learners should be able to

1. Comprehend Project Management Concepts
2. Use various tools of Software Project Management
3. Schedule various activities in software projects
4. Track a project and manage changes
5. Apply Agile Project Management
6. Analyse staffing process for team building and decision making in Software Projects and Management

Subject Code & Name - 310246: Database Management Systems Laboratory

Course Objectives

1. To develop Database programming skills
2. To develop basic Database administration skills
3. To develop skills to handle NoSQL database
4. To learn, understand and execute process of software application development

Course Outcomes

On completion of the course, learners will be able to

1. Design E-R Model for given requirements and convert the same into database tables
2. Design schema in appropriate normal form considering actual requirements
3. Implement SQL queries for given requirements, using different SQL concepts
4. Implement PL/SQL Code block for given requirements
5. Implement NoSQL queries using MongoDB
6. Design and develop application considering actual requirements and using database concepts

Subject Code &Name - 310247: Computer Networks and Security Laboratory

Course Objectives

1. To learn computer network hardware and software components
2. To learn computer network topologies and types of network
3. To develop an understanding of various protocols, modern technologies and applications
4. To learn modern tools for network traffic analysis
5. To learn network programming

Course Outcomes

On completion of the course, learners will be able to

1. Analyze the requirements of network types, topology and transmission media
2. Demonstrate error control, flow control techniques and protocols and analyze them
3. Demonstrate the subnet formation with IP allocation mechanism and apply various routing algorithms
4. Develop Client-Server architectures and prototypes
5. Implement web applications and services using application layer protocols
6. Use network security services and mechanisms

Subject Code &Name - 310248: Laboratory Practice I

Course Objectives

1. To learn system programming tools
2. To learn modern operating system
3. To learn various techniques, tools, applications in IoT and Embedded Systems /Human Computer Interface/Distributed Systems/ Software Project Management

Course Outcomes

On completion of the course, learners will be able to

Systems Programming and Operating System

1. Implement language translators
2. Use tools like LEX and YACC
3. Implement internals and functionalities of Operating System

Internet of Things and Embedded Systems

1. Design IoT and Embedded Systems based application
2. Develop smart applications using IoT
3. Develop IoT applications based on cloud environment

OR

Human Computer Interface

1. Implement the interactive designs for feasible data search and retrieval
2. Analyze the scope of HCI in various paradigms like ubiquitous computing, virtual Reality and ,multi-media, World wide web related environments
3. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems

OR

Distributed Systems

1. Demonstrate knowledge of the core concepts and techniques in Distributed Systems
2. Apply the principles of state-of-the-Art Distributed Systems in real time applications
3. Design, build and test application programs on Distributed Systems

OR

Software Project Management

1. Apply Software Project Management tools
2. Implement software project planning and scheduling
3. Analyse staffing in software project

SEM-II

Subject Code &Name - 310251: Data Science and Big Data Analytics

Course Objectives

1. To understand the need of Data Science and Big Data
2. To understand computational statistics in Data Science
3. To study and understand the different technologies used for Big Data processing
4. To understand and apply data modeling strategies
5. To learn Data Analytics using Python programming
6. To be conversant with advances in analytics

Course Outcomes

After completion of the course, learners should be able to

1. Analyze needs and challenges for Data Science Big Data Analytics
2. Apply statistics for Big Data Analytics
3. Apply the lifecycle of Big Data analytics to real world problems
4. Implement Big Data Analytics using Python programming
5. Implement data visualization using visualization tools in Python programming
6. Design and implement Big Databases using the Hadoop ecosystem

Subject Code &Name - 310252: Web Technology

Course Objectives

1. To learn the fundamentals of web essentials and markup languages
2. To use the Client side technologies in web development
3. To use the Server side technologies in web development
4. To understand the web services and frameworks

Course Outcomes

On completion of the course, learners should be able to

1. Implement and analyze behavior of web pages using HTML and CSS
2. Apply the client side technologies for web development
3. Analyze the concepts of Servlet and JSP
4. Analyze the Web services and frameworks
5. Apply the server side technologies for web development
6. Create the effective web applications for business functionalities using latest web development platforms

Subject Code &Name - 310253: Artificial Intelligence

Course Objectives

1. To understand the concept of Artificial Intelligence (AI) in the form of various Intellectual tasks
2. To understand Problem Solving using various peculiar search strategies for AI
3. To understand multi-agent environment in competitive environment
4. To acquaint with the fundamentals of knowledge and reasoning
5. To devise plan of action to achieve goals as a critical part of AI
6. To develop a mind to solve real world problems unconventionally with optimality

Course Outcomes

After completion of the course, students should be able to

1. Identify and apply suitable Intelligent agents for various AI applications
2. Build smart system using different informed search / uninformed search or heuristic approaches
3. Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem
4. Apply the suitable algorithms to solve AI problems

5. Implement ideas underlying modern logical inference systems
6. Represent complex problems with expressive yet carefully constrained language of representation

Subject Code &Name - 310254(A): Information Security

Course Objectives

1. To understand the fundamental approaches, principles and apply these concepts in Information Security
2. To acquire the knowledge of mathematics for cryptography, understand the concepts of basic cryptography
3. To learn standard algorithms and protocols employed to provide confidentiality, integrity and authenticity
4. To acquire the knowledge of security protocol deployed in web security
5. To study Information Security tools

Course Outcomes

On completion of the course, learners should be able to

1. Understand the basics of Augmented and Virtual reality systems and list their applications
2. Describe interface to the Virtual World with the help of input and output devices
3. Explain representation and rendering system in the context of Virtual Reality
4. Analyze manipulation, navigation and interaction of elements in the virtual world
5. Summarize the basic concepts and hardware of Augmented Reality system
6. Create Mobile Augmented Reality using Augmented Reality techniques and software

Subject Code &Name - 310254(C): Cloud Computing

Course Objectives

1. To study fundamental concepts of cloud computing
2. To learn various data storage methods on cloud
3. To understand the implementation of Virtualization in Cloud Computing
4. To learn the application and security on cloud computing
5. To study risk management in cloud computing
6. To understand the advanced technologies in cloud computing

Course Outcomes

On completion of the course, learners should be able to

1. Understand the different Cloud Computing environment
2. Use appropriate data storage technique on Cloud, based on Cloud application
3. Analyze virtualization technology and install virtualization software
4. Develop and deploy applications on Cloud
5. Apply security in cloud applications
6. Use advance techniques in Cloud Computing

Subject Code &Name - 310254(D): Software Modeling and Architecture

Course Objectives

1. To understand and apply Object Oriented concept for designing Object Oriented based model or application
2. To transform Requirement document to appropriate design
3. To acquaint with the interaction between quality attributes and software architecture
4. To understand different architectural designs, transform them into proper model and document them
5. To understand software architecture with case studies and explore with examples, use of design pattern application

Course Outcomes

On completion of the course, learners should be able to

1. Analyze the problem statement (SRS) and choose proper design technique for designing web-based/desktop application
2. Design and analyze an application using UML modeling as fundamental tool
3. Evaluate software architectures
4. Use appropriate architectural styles and software design pattern
5. Apply appropriate modern tool for designing and modeling

Subject Code &Name - 310256: Data Science and Big Data Analytics Laboratory

Course Objectives

1. To understand principles of Data Science for the analysis of real time problems
2. To develop in depth understanding and implementation of the key technologies in Data Science and Big Data Analytics
3. To analyze and demonstrate knowledge of statistical data analysis techniques for decision- making
4. To gain practical, hands-on experience with statistics programming languages and Big Data tools

Course Outcomes

On completion of the course, learners will be able to

1. Apply principles of Data Science for the analysis of real time problems
2. Implement data representation using statistical methods
3. Implement and evaluate data analytics algorithms
4. Perform text preprocessing
5. Implement data visualization technique
6. Use cutting edge tools and technologies to analyze Big Data

Subject Code &Name - 310257: Web Technology Laboratory

Course Objectives

1. To learn the web based development environment
2. To use client side and server side web technologies
3. To design and develop web applications using front end technologies and backend databases

Course Outcomes

On completion of the course, learners will be able to

1. Understand the importance of website planning and website design issues
2. Apply the client side and server side technologies for web application development
3. Analyze the web technology languages, frameworks and services.
4. Create three tier web based applications

Subject Code &Name - 310258: Laboratory Practice II

Course Objectives

1. To learn and apply various search strategies for AI
2. To Formalize and implement constraints in search problems
3. To understand the concepts of Information Security / Augmented and Virtual Reality/Cloud Computing/Software Modeling and Architectures

Course Outcomes

On completion of the course, learner will be able to

Artificial Intelligence

1. Design a system using different informed search / uninformed search or heuristic approaches
2. Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning
3. Design and develop an interactive AI application

Information Security

1. Use tools and techniques in the area of Information Security
2. Use the cryptographic techniques for problem solving
3. Design and develop security solution

OR

Augmented and Virtual Reality

1. Use tools and techniques in the area of Augmented and Virtual Reality
2. Use the representing and rendering system for problem solving
3. Design and develop ARVR applications

OR

Cloud Computing

1. Use tools and techniques in the area of Cloud Computing
2. Use cloud computing services for problem solving
3. Design and develop applications on cloud

OR

Software Modeling and Architectures

1. Use tools and techniques in the area Software Modeling and Architectures
2. Use the knowledge of Software Modeling and Architectures for problem solving
3. Design and develop applications using UML as fundamental tool



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Savitribai Phule Pune University, Pune

Third Year Electronics & Telecommunication (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name - 304181: Digital Communication

Course Objectives

To make the students understand

1. To familiarize students with various digital modulation techniques used in digital communication systems.
2. To equip students with tools required for performance analysis of digital communication systems.
3. To introduce the students with the concept of information theory & coding techniques.

Course Outcomes

On completion of the course, learner will be able to-

1. Apply the statistical theory for describing various signals in a communication system.
2. Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
3. Describe and analyze the digital communication system with spread spectrum modulation.
4. Analyze a communication system using information theoretic approach.
5. Use error control coding techniques to improve performance of a digital communication system.

Subject Code & Name - 304182: Electromagnetic Field Theory

Course Objectives

1. Provide the foundation and rudiments of Electromagnetic theory essential to subsequent courses of radiation, microwave and wireless communications.
2. Expose the students to basic laws of electro statics, magneto statics leading to the Maxwell Equations for static and dynamic fields.
3. Extend these laws to Uniform Plane waves, transmission line theory and some of the case studies of applications of engineering electromagnetic field theory.
4. The main focus will be on the physical interpretation of all the mathematical formulations and extend these concepts to real time applications in the field Electronics and Telecommunication Engineering.

Course Outcomes

On completion of the course, learner will be able to –

1. Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.
2. Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.
3. State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.
4. Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.
5. Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line,

Find input/load impedance, input/load admittance, reflection coefficient, SWR, V_{max}/V_{min} , length of transmission line using Smith Chart.

6. Carry out a detailed study, interpret the relevance and applications of Electromagnetics

Subject Code &Name - 304183: Database Management

Course Objectives

1. To understand fundamental concepts of database from its design to its implementation.
2. To analyze database requirements and determine the entities involved in the system and with one another.
3. To manipulate database using SQL Query to create, update and manage Database.
4. Be familiar with the basic issues of transaction processing and concurrency control.
5. To learn and understand Parallel Databases and its Architectures.
6. To learn and understand Distributed Databases and its applications.

Course Outcomes

On completion of the course, learner will be able to –

1. Ability to implement the underlying concepts of a database system.
2. Design and implement a database schema for a given problem-domain using data model.
3. Formulate, using SQL/DML/DDDL commands, solutions to a wide range of query and update problems.
4. Implement transactions, concurrency control, and be able to do Database recovery.
5. Able to understand various Parallel Database Architectures and its applications.
6. Able to understand various Distributed Databases and its applications

Subject Code &Name - 304184: Microcontroller

Course Objectives

During the course study students will be able to

1. Understand architecture and features of 8051 and PIC18FXX Microcontroller.
2. Learn interfacing of real-world peripheral devices with microcontroller.
3. Explore different features of PIC 18F Microcontroller with Architecture.
4. Use concepts of timers and interrupts of PIC 18 in programming.
5. Design and develop microcontroller based embedded application.
6. Demonstrate real life applications using PIC 18.

Course Outcomes

On completion of the course, learner will be able to –

1. Understand the fundamentals of microcontroller and programming.
2. Interface various electronic components with microcontrollers.
3. Analyze the features of PIC 18F XXXX.
4. Describe the programming details in peripheral support.
5. Develop interfacing models according to applications.
6. Evaluate the serial communication details and interfaces.

Subject Code &Name - 304185 (A): Digital Signal Processing (Elective -I)

Course Objectives

1. Understand the sampling, aliasing and block schematic of digital signal processing.
2. Introduction of transforms for analysis of systems using Z transform.
3. Introduction of DFT, FFT, DCT transforms for analysis of DT signals.
4. Design and implementation of IIR digital filters.
5. Design and implementation of FIR digital filters.
6. Apply DSP algorithms/techniques.

Course Outcomes

On completion of the course, student will be able to –

1. Interpret and process discrete/ digital signals and represent DSP system.

2. Analyze the digital systems using the Z-transform techniques.
3. Implement efficient transform and its application to analyze DT signals.
4. Design and implement IIR filters.
5. Design and implement FIR filters.
6. Apply DSP techniques for speech/ biomedical/ image signal processing.

Subject Code &Name -304185 (B): Electronic Measurements (Elective –I)

Course Objectives

To make the students understand

1. Fundamental principles of measurement systems.
2. Basic electronics measuring instruments and analyzers.
3. Use of different types of Signal Generators.
4. Working principle and use of different types of Oscilloscopes.
5. Use of other display devices, recorders and timer/counter.
6. Advanced measurement systems.

Course Outcomes

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

1. Understand the metrics for the measurement system
2. Select and use the instruments for measurement & analysis of basic electronic parameters
3. Identify and use the different signal generators for specific applications
4. Understand the principles of different Oscilloscopes for specific applications
5. Identify the use of other display devices, recorders and timer/counter in measurement systems
6. Use the advanced measurement systems for electronics parameter measurement

Subject Code &Name - 304185 (C): Fundamentals of JAVA Programming (Elective -I)

Course Objectives

1. Make the students familiar with basic concepts and techniques of object oriented programming in Java.
2. Develop an ability to write various programs in Java for problem solving.

Course Outcomes

On completion of the course, learner will be able to –

1. Understand the basic principles of Java programming language
2. Apply the concepts of classes and objects to write programs in Java
3. Demonstrate the concepts of methods & Inheritance
4. Use the concepts of interfaces & packages for program implementation
5. Understand multithreading and Exception handling in Java to develop robust programs
6. Use Graphics class, AWT packages and manage input and output files in Java

Subject Code &Name - 304185 (D): Computer Networks (Elective -I)

Course Objectives

1. To understand the concepts of networking, its standards and protocols.
2. To learn controlling techniques in networking at different layers.
3. To learn protocols at different layers of reference model.
4. To understand routing and networking in inter and intra domain.
5. To learn network programming.
6. To understand applications, protocols and its implication in networks.

Course Outcomes

On completion of the course, learner will be able to –

1. Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices.
2. Understand the working of controlling techniques for flawless data communication using data link layer protocols.

3. Learn the functions of network layer, various switching techniques and internet protocol addressing.
4. Explore various interior and exterior, unicasting and multicasting protocols.
5. Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS.
6. Illustrate the use of protocols at application layer.

Subject Code & Name - 304190: Skill Development

Course Objectives

1. To build and upgrade practical knowledge of an individual.
2. To make students employable with required skill set.
3. To promote youth work to assist "Make in India" initiative.
4. To grow and build confidence among students on specific skill sets.
5. To cultivate Entrepreneur mindset after getting required experience.
6. To improve professional skills such as moral/ethics/team work/communication skill/lifelong learning etc.

Course Outcome

After successfully completing the course,

1. Student should recognize the need to engage in independent and life-long learning in required **skill** sets
2. 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.
3. Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.
4. Student would be able to communicate effectively at different technical and administrative levels.
5. Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.

SEM-II

Subject Code &Name - 304192: Cellular Networks

Course Objectives

To make the students understand

1. Various propagation Model and Estimation techniques of wireless communication system.
2. OFDM and MIMO technologies to explain modern wireless systems.
3. Various aspects of mobile communication system.
4. Various aspects of wireless-system planning.
5. Different Generation of Mobile Networks.
6. Diversified issues that can enhance Network Performance.

Course Outcomes

On completion of the course, learner will be able to –

1. Understand fundamentals of wireless communications.
2. Discuss and study OFDM and MIMO concepts.
3. Elaborate fundamentals mobile communication.
4. Describes aspects of wireless system planning.
5. Understand of modern and futuristic wireless networks architecture.
6. Summarize different issues in performance

Subject Code &Name - 304193: Project Management

Course Objectives

To make the students understand

1. The basics of project management and its life cycle
2. The process of project identification, selection criteria of the project and how the project planning is undertaken.
3. The organizational structure within a project and issues related to project management
4. The techniques for effective project scheduling and resource considerations in project.
5. The basics of effective handling the risks as well as managing finances within the project
6. The complete product development process and requirements for entrepreneurship along with related legal issues.

Course Outcomes

On completion of the course, learner will be able to –

1. Apply the fundamental knowledge of project management for effectively handling the projects.
2. Identify and select the appropriate project based on feasibility study and undertake its effective planning.
3. Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
4. Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
5. Identify and assess the project risks and manage finances in line with Project Financial Management Process.
6. Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship

Subject Code &Name - 304194: Power Devices & Circuits

Course Objectives

1. To introduce different power devices viz. SCR, GTO, MOSFET and IGBT with construction, characteristics, repetitive and non repetitive ratings and typical triggering/driver circuits.
2. To understand working, design and performance analysis and applications of various power converter circuits such as ac to dc converters, inverter and chopper

3. To know various protection circuit requirements of power electronic devices.

Course Outcomes

On completion of the course, learner will be able –

1. 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.
2. To design triggering / driver circuits for various power devices.
3. To evaluate and analyze various performance parameters of the different converters and its topologies.
4. To understand significance and design of various protection circuits for power devices.
5. To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.
6. To understand case studies of power electronics in applications like electric vehicles, solar systems etc.

Subject Code & Name -304195 (A): Digital Image Processing (Elective -II)

Course Objectives

1. To become familiar with digital image fundamentals.
2. To get exposed to simple image enhancement techniques in Spatial and Frequency domain.
3. To study the image segmentation and representation techniques.
4. To become familiar with image compression methods.
5. To learn concepts of degradation function and restoration techniques.
6. To understand the Object Recognition.

Course Outcomes

On completion of the course, learner will be able to –

1. Apply knowledge of mathematics for image understanding and analysis.
2. Implement spatial domain image operations.
3. Design and realize various algorithms for image segmentation.
4. Design and realize various algorithms for image Compression.
5. Apply restoration to remove noise in the image.
6. Describe the object recognition system.

Subject Code & Name -304195 (B): Sensors in Automation (Elective -II)

Course Objectives

To make the students understand about:

1. Concept of Sensors/Transducers and their Static and Dynamic Characteristics.
2. Sensors used in Industry for Temperature and Humidity Measurement.
3. Sensors used for Force, Pressure, Stress and Flow measurements.
4. Sensors used for Displacement and Level Measurement.
5. Applications of Image and Biosensors.
6. Role of Sensors/Transducers in IoT applications.

Course Outcomes

On completion of the course, learner will be able to –

1. Understand the Concepts of Sensors/Transducers, classify and evaluate static and Dynamic Characteristics of Measurement Systems.
2. Choose the proper sensor comparing different standards and guidelines for measurements of Temperature and Humidity.
3. Choose the proper sensor comparing different standards and guidelines for measurements of Force, Pressure, Stress and Flow
4. Choose the proper sensor comparing different standards and guidelines for measurements of Displacement, Vibration, Acceleration and Level

5. Explore sensors to profound areas like environmental, Agricultural and bio-medical equipment and sustainability.
6. Explore IoT based applications of Sensors and Transducer

Subject Code &Name-304195 (C): Advanced JAVA Programming (Elective -II)

Course Objectives

Make the learner to:

1. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
2. Design and develop Web applications
3. Designing Enterprise based applications by encapsulating an application's business logic.
4. Designing applications using pre-built frameworks.

Course Outcomes

On completion of the course, learner will be able to –

1. Design and develop GUI applications using Applets.
2. Apply relevant AWT/ swing components to handle the given event.
3. Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
4. Learn to access database through Java programs, using Java Database Connectivity (JDBC)
5. Invoke the remote methods in an application using Remote Method Invocation (RMI)
6. Develop program for client /server communication using Java Networking classes.

Subject Code &Name -304195 (D): Embedded Processors(Elective -II)

Course Objectives

1. To make the **students** aware of the need of Embedded C and programming in Embedded C.
2. To get the students acquainted with the need and applications of ARM Microprocessors in Embedded systems. • To get insight of architecture and features of ARM 7 and ARM CORTEX M4 microcontroller.
3. To enhance the capabilities of students to interface of various I/O devices, sensors and communication devices.

Course Outcomes

On completion of the course, learner will be able to –

1. Understand basics of Embedded C Programming and usage of Embedded C and study different software tools for programming microcontrollers.
2. Get acquainted with various Embedded Processor architectures related to industrial application.
3. Know about the programming of ARM 7 based microcontroller with on chip peripherals and external peripherals.
4. Understand the architectures of ARM Cortex M4 Microcontrollers and its advantages over ARM 7 Microcontrollers.
5. Implement the real world programming of ARM 7 based microcontroller with on chip peripherals and external peripherals.
6. Recognize the interfacing of real world sensors and standard buses. Will also able to design different case studies

Subject Code &Name - 304195 (E): Network Security (Elective-II)

Course Objectives

To introduce various network models, security threats and attacks and fundamentals of network security.

1. To imbibe good foundation of network security in students for implementation of new network security algorithms.
2. To understand different network models and the protocols used in each layer.
3. To acquire detailed approach of encryption decryption for the data to transmit.
4. To understand the role of network security as a tool for protection of different network entities.

5. To be able to accurately apply security algorithms to real world security issues.
6. To ensure windows and web browser security through implementation of various encryption standards.

Course Outcomes

On completion of the course, learner will be able to –

1. Analyze attacks on computers and computer security.
2. Demonstrate knowledge of cryptography techniques.
3. Illustrate various Symmetric and Asymmetric keys for Ciphers
4. Evaluate different Message Authentication Algorithms and Hash Functions
5. Get acquainted with various aspects of E-Mail Security
6. Assimilate various aspects of Web Security

Subject Code &Name- 304199: Internship

Course Objective

1. Will expose technical students to the industrial environment, which cannot be simulated in the classroom and hence creating competent professionals for the industry.
2. Provide possible opportunities to learn, understand and sharpen the real time technical / managerial skills required at the job.
3. Exposure to the current technological developments relevant to the subject area of training.
4. Experience gained from the 'Internship' will be used in classroom discussions.
5. Create conditions conducive to quest for knowledge and its applicability on the job.
6. Learn to apply the Technical knowledge in real industrial situations.
7. Gain experience in writing Technical reports/projects.
8. Expose students to the engineer's responsibilities and ethics.
9. Familiarize with various materials, processes, products and their applications along with relevant aspects of quality control.
10. Promote academic, professional and/or personal development.
11. Expose the students to future employers.
12. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations.
13. Understand the psychology of the workers and their habits, attitudes and approach to problem solving.

Course Outcomes

On completion of the internship, learner will be able to –

1. To develop professional competence through internship.
2. To apply academic knowledge in a personal and professional environment.
3. To build the professional network and expose students to future employees.
4. Apply professional and societal ethics in their day to day life.
5. To become a responsible professional having social, economic and administrative considerations.
6. To make own career goals and personal aspirations.

Subject Code &Name -304200: Mini Project

Course Objectives

1. To understand the —Product Development Process" including budgeting through Mini Project.
2. To plan for various activities of the project and distribute the work amongst team members.
3. To inculcate electronic hardware implementation skills by –
4. Learning PCB artwork design using an appropriate EDA tool.
5. Imbibing good soldering and effective trouble-shooting practices. • Following correct grounding and shielding practices.
6. To develop student's abilities to transmit technical information clearly and test the same by delivery of Seminar based on the Mini Project.

7. To understand the importance of document design by compiling Technical Report on the Mini Project work carried out.

Course Outcome

On completion of the course, student will be able to

1. Understand, plan and execute a Mini Project with team.
2. Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
3. Prepare a technical report based on the Mini project.
4. Deliver technical seminar based on the Mini Project work carried out.

CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Third Year Information Technology Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEMI

Subject Code &Name -314441: Theory of Computation

Course Objectives

1. To know the applicability of the model of computation to different problems.
2. To understand in detail the relationship among formal languages, formal grammars and automata.
3. To learn the design of Finite Automata, Pushdown Automata and Turing Machine for processing of formal languages.
4. To study the theory of computability and complexity for algorithm design.

Course Outcomes

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

1. Construct finite automata and its variants to solve computing problems.
2. Write regular expressions for the regular languages and finite automata.
3. Identify types of grammar, design and simplify Context Free Grammar.
4. Construct Pushdown Automata machine for the Context Free Language.
5. Design and analyze Turing machines for formal languages.
6. Understand decidable and undecidable problems, analyze complexity classes.

Subject Code &Name -314442: Operating Systems

Course Objectives

1. To introduce basic concepts and functions of modern operating systems.
2. To understand the concept of process, thread management and scheduling.
3. To learn the concept of concurrency control.
4. To study various Memory Management techniques.
5. To know the concept of I/O and File management.
6. To learn concept of system software.

Course Outcomes

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

1. Explain the role of Modern Operating Systems.
2. Apply the concepts of process and thread scheduling.
3. Illustrate the concept of process synchronization, mutual exclusion and the deadlock.
4. Implement the concepts of various memory management techniques.
5. Make use of concept of I/O management and File system.
6. Understand Importance of System software.

Subject Code &Name -314443: Machine Learning

Course Objectives

1. To understand the basic concepts of machine learning and apply them for the various problems.
2. To learn various machine learning types and use it for the various machine learning tasks.
3. To optimize the machine learning model and generalize it.

Course Outcomes

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

1. Apply basic concepts of machine learning and different types of machine learning algorithms.

2. Differentiate various regression techniques and evaluate their performance.
3. Compare different types of classification models and their relevant application.
4. Illustrate the tree-based and probabilistic machine learning algorithms.
5. Identify different unsupervised learning algorithms for the related real-world problems.
6. Apply fundamental concepts of ANN.

Subject Code &Name -314444: Human Computer Interaction

Course Objectives

1. To introduce to the field of human-computer-interaction study.
2. To gain an understanding of the human part of human-computer-interactions.
3. To learn to do design and evaluate effective human-computer-interactions.
4. To study HCI models and theories.
5. To understand HCI design processes.
6. To apply HCI to real life use cases.

Course Outcomes

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

1. Explain importance of HCI study and principles of user-centered design (UCD) approach.
2. Develop understanding of human factors in HCI design.
3. Develop understanding of models, paradigms, and context of interactions.
4. Design effective user-interfaces following a structured and organized UCD process.
5. Evaluate usability of a user-interface design.
6. Apply cognitive models for predicting human-computer-interactions.

Subject Code &Name-314445(A): Elective -I: Design and Analysis of Algorithm

Course Objectives

1. To understand the problem solving and problem classification.
2. To know the basics of computational complexity analysis of various algorithms.
3. To provide students with foundations to deal with a variety of computational problems using different design strategies.
4. To select appropriate algorithm design strategies to solve real world problems.
5. To understand the concept of nondeterministic polynomial algorithms.

Course Outcomes

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

1. Calculate computational complexity using asymptotic notations for various algorithms.
2. Apply Divide & Conquer as well as Greedy approach to design algorithms.
3. Understand and analyze optimization problems using dynamic programming.
4. Illustrate different problems using Backtracking.
5. Compare different methods of Branch and Bound strategy.
6. Classify P, NP, NP-complete, NP-Hard problems.

Subject Code &Name -314445(B): Elective -I: Advanced Database Management System

Course Objectives

1. To understand the fundamental concepts of Relational and Object-oriented databases.
2. To learn and understand various Parallel and Distributed Database Architectures and Applications.
3. To understand and apply the basic concepts, categories and tools of NoSQL Database.
4. To learn and understand Data warehouse and OLAP Architectures and Applications.
5. To learn data mining architecture, algorithms, software tools and applications.
6. To learn enhanced data models for advanced database applications.

Course Outcomes

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

1. Differentiate relational and object-oriented databases.
2. Illustrate parallel & distributed database architectures.

3. Apply concepts of NoSQL Databases.
4. Explain concepts of data warehouse and OLAP technologies.
5. Apply data mining algorithms and various software tools.
6. Comprehend emerging and enhanced data models for advanced applications.

Subject Code & Name - 314445(C): Elective -I: Design Thinking

Course Objectives

1. To learn the Design thinking basic concepts.
2. To identify the opportunities and challenges for design thinking innovation.
3. To describe the define and ideate process of design thinking.
4. To summarize the prototyping techniques.
5. To enlist the activities carried out in Test and reflect phase of design thinking.
6. To Interpret Design Thinking case studies.

Course Outcomes

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

1. Identify need and features of design thinking.
2. Identify the opportunities and challenges for design thinking innovation.
3. Learn the process of design thinking using various tools.
4. Summarize and learn the various prototyping techniques.
5. Enlist the activities carried out in Test and reflect phase of design thinking.
6. Interpret the design thinking disruptive innovations through case studies.

Subject Code & Name - 314446: Operating Systems Lab

Course Objectives

1. To introduce and learn Linux commands required for administration.
2. To learn shell programming concepts and applications.
3. To demonstrate the functioning of OS basic building blocks like processes, threads under the LINUX.
4. To demonstrate the functioning of OS concepts in user space like concurrency control (process synchronization, mutual exclusion), CPU Scheduling, Memory Management and Disk Scheduling in LINUX.
5. To demonstrate the functioning of Inter Process Communication under LINUX.
6. To study the functioning of OS concepts in kernel space like embedding the system call in any LINUX Kernel.

Course Outcomes

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

1. Apply the basics of Linux commands.
2. Build shell scripts for various applications.
3. Implement basic building blocks like processes, threads under the Linux.
4. Develop various system programs for the functioning of OS concepts in user space like concurrency control, CPU Scheduling, Memory Management and Disk Scheduling in Linux.
5. Develop system programs for Inter Process Communication in Linux

Subject Code & Name - 314447: Human Computer Interaction Laboratory

Course Objectives

1. To study the field of human-computer-interaction.
2. To gain an understanding of the human part of human-computer-interactions.
3. To learn to do design and evaluate effective human-computer-interactions.
4. To study HCI models and theories.
5. To understand HCI design processes.
6. To apply HCI to real life use cases.

Course Outcomes

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

1. Differentiate between good design and bad design.
2. Analyze creative design in the surrounding.
3. Assess design based on feedback and constraint.
4. Design paper-based prototypes and use wire frame.
5. Implement user-interface design using web technology.
6. Evaluate user-interface design using HCI evaluation techniques.

Subject Code & Name -314448 (A): Laboratory Practice-I (Design and Analysis of Algorithm)

Course Objectives

1. To learn the various algorithmic design strategies.
2. To apply efficiently in problem solving.

Course Outcomes

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

1. Implement the various algorithmic design strategies and use it to solve real time problems/ applications
2. Apply Divide & Conquer as well as Greedy approach to design algorithms.
3. Analyze optimization problems using dynamic programming.

Subject Code &Name -314448 (B): Laboratory Practice-I (ADBMS)

Course Objectives

1. To learn and understand Database Modeling, Architectures.
2. To learn and understand Advanced Database Programming Frameworks.
3. To learn NoSQL Databases (Open source) such as MongoDB.
4. To design and develop application using NoSQL Database.
5. To design data warehouse schema for given system.

Course Outcomes

On completion of the course, students will be able to

1. Apply advanced Database Programming Languages.
2. Apply the concepts of NoSQL Databases.
3. Install and configure database systems.
4. Populate and query a database using MongoDB commands.
5. Design data warehouse schema of any one real-time: CASE STUDY

Subject Code &Name -314448 (C): Laboratory Practice-I (Design Thinking)

Course Objectives

1. To identify the opportunities and challenges for design thinking innovation and empathize and ideate for it.
2. To describe the solution by prototyping the design.

Course Outcomes

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

1. Frame and Design Challenge by performing STEEP Analysis, Conduct Interviews, design and ask 5x Why and 5W+H questions.
2. Demonstrate the activities to empathize with the users by creation of Empathy Map, Persona Development, Customer Journey Map.
3. Define and ideate process of design thinking and perform brainstorming, selection of ideas, create a storyboard and design paper prototyping or digital prototyping for chosen design challenge.

Subject Code &Name -314448 (D): Laboratory Practice-I (Internet of Things)

Course Objectives

1. To learn interfacing of sensor and actuators using Arduino Uno/Raspberry Pi
2. To learn and understand IoT platforms and its significance for real time applications
3. To learn and understand the steps involved in python programming for IoT applications

Course Outcomes

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

1. Design and implement real time applications with sensors and actuators.
2. Design and develop real time IoT based application by cloud interfacing.

Subject Code &Name -314449: Seminar

Course Objectives

Seminar should make the student attain skills like:

1. To gather the literature of specific area in a focused manner.
2. To summarize the literature to find state-of-the-art in proposed area.
3. To identify scope for future work.
4. To present the case for the intended work to be done as project.
5. To report literature review and proposed work in scientific way.

Course Outcomes

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

1. Understand, interpret and summarize technical literature.
2. Demonstrate the techniques used in the paper.
3. Distinguish the various techniques required to accomplish the task.
4. Identify intended future work based on the technical review.
5. Prepare and present the content through various presentation tools and techniques in effective manner.
6. Keep audience engaged through improved interpersonal skills.

SEM-II

Subject Code &Name -314451: Computer Network and Security

Course Objectives

To familiarize students with-

1. The application layer services, responsibilities and protocol.
2. Fathom wireless network and different wireless standards
3. Differences in different wireless networks and to learn different mechanism used at layers of wireless network.
4. The concept of network security.
5. Basic cryptographic techniques in application development.
6. Cyber security vulnerabilities & study typical threats to modern digital systems.

Course Outcomes

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

1. Explain Responsibilities, services offered and protocol used at application layer of network
2. Apply concepts of wireless network and different wireless standards.
3. Recognize the Adhoc Network's MAC layer, routing protocol and Sensor network architecture.
4. Implement the principal concepts of network security and Understand network security threats, security services, and countermeasures
5. Apply basic cryptographic techniques in application development.
6. Gain a good comprehension of the landscape of cyber security Vulnerabilities & describe typical threats to modern digital systems.

Subject Code &Name -314452: Data Science and Big Data Analytics

Course Objectives

1. To introduce basic need of Big Data and Data science to handle huge amount of data.
2. To understand the basic mathematics behind the Big data.
3. To understand the different Big data processing technologies.
4. To understand and apply the Analytical concept of Big data using Python.
5. To visualize the Big Data using different tools.
6. To understand the application and impact of Big Data.

Course Outcomes

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

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

Subject Code & Name -314453: Web Application Development

Course Objectives

1. To familiarize students with Web Programming basic concepts
2. To learn and understand Web scripting languages.
3. To explore the Front end& Backend web programming skills.
4. To understand and learn Mobile web development.
5. To understand and learn Web application deployment.

Course Outcomes

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

1. Develop Static and Dynamic website using technologies like HTML, CSS, Bootstrap.
2. Demonstrate the use of web scripting languages.

3. Develop web application with Front End & Back End Technologies.
4. Develop mobile website using JQuery Mobile.
5. Deploy web application on cloud using AWS

Subject Code &Name - 314454 (A): Elective-II (Artificial Intelligence)

Course Objectives

1. To understand Fundamental concepts of Artificial Intelligence and different search strategies.
2. To explore various knowledge representations and reasoning schemes.
3. To understand Fundamentals of NLP and Game Theory.
4. To explore of AI applications.

Course Outcomes

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

1. Apply the fundamental concepts of Artificial Intelligence
2. Choose appropriate search strategies for any AI problem
3. Illustrate knowledge reasoning and knowledge representation methods (for solving real world problems)
4. Analyze the suitable techniques of NLP to develop AI applications
5. Correlate the appropriate methods of Game Theory to design AI applications
6. Understand the concept of deep learning and AI applications

Subject Code &Name - 314454 (B): Elective-II (Cyber Security)

Course Objectives

1. To learn fundamental concepts of cyber security
2. To learn different types of threats and cyber-crimes.
3. To understand the basics cyber forensics, network forensics, Email forensics, web forensics and crypto currency forensics.
4. To understand the basic digital forensics concepts and techniques for conducting the forensic examination on different digital devices.
5. To analyze how particular social engineering attacks take advantage of specific features of the Internet and of human nature.
6. To learn the IT laws and cyber-crime basics.

Course Outcomes

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

1. Develop basic understanding of cyber security.
2. Differentiate among different types of cyber threats and cyber-crimes.
3. Illustrate cyber forensic techniques to identify the criminal activities.
4. Apply forensic analysis tools to recover important evidence for identifying computer crime
5. Distinguish and classify the forms of cybercriminal activity and the technological and social engineering' methods used to undertake such crimes
6. Evaluate the effectiveness of cyber-security, cyber-laws and other countermeasures against Cybercrime

Subject Code &Name - 314454 (C): Elective-II- (Cloud Computing)

Course Objectives

1. To provide students with the fundamentals and essentials of cloud computing
2. To learn basics of virtualization and its importance
3. To provide students a sound foundation of the cloud computing so that they are able to start using and adopting cloud computing services and tools in their real life scenarios
4. To enable students exploring some important cloud computing driven commercial systems and applications
5. To understand cloud storage technologies and relevant file systems
6. To be exposed to Ubiquitous Cloud and Internet of Things

Course Outcomes

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

1. Articulate the main concepts, key technologies and fundamentals of cloud computing.
2. Understand cloud enabling technologies and virtualization.
3. Analyze various cloud programming models and apply them to solve problems on the cloud.
4. Explain data storage and major security issues in the cloud.
5. Understand trends in ubiquitous cloud and internet of things.
6. Explore future trends of cloud computing.

Subject Code & Name - 314454 (D): Elective –II (Software Modeling and Design)

Course Objectives

1. To understand and use of UML to arrive at a design solution for real world problems.
2. To understand basics of object-oriented Modeling.
3. To learn Design concepts to Model for real world problems using object modeling.
4. To explore Interaction and behavior modeling.
5. To understand Software design principles and patterns.
6. To explore the architectural design guidelines in various type of application development.

Course Outcomes

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

1. Understand basics of object oriented methodologies and Unified Modeling Language (UML).
2. Apply analysis process, use case modeling, domain/class modeling
3. Design and apply interaction and behavior modeling on a given system.
4. Comprehend OO design process and business, access and view layer class design.
5. Recognize the software design principles and pattern to be applied on system.
6. Illustrate architectural design principles and guidelines in the various type of application development.

Subject Code &Name - 314455: Internship

Course Objectives

1. To encourage and provide opportunities for students to get professional/personal experience through internships.
2. To learn and apply the technical knowledge gained from academics /classroom learning in real life/industrial situations.
3. To get familiar with various tools and technologies used in industries and their applications.
4. To enable students to develop professional skills and expand their professional network with the development of employer-valued skills like teamwork, communication.
5. To apply the experience gained from industrial internship to the academic course completion project.
6. To nurture professional and societal ethics in students
7. Understand the social, economic and administrative considerations that influence the working environment of industrial organizations

Course Outcomes

On completion of the internship, learner will be able to –

1. Develop professional competence through industry internship.
2. Apply academic knowledge in a personal and professional environment
3. Build the professional network and expose students to future employees.
4. Apply professional and societal ethics in their day-to-day life.
5. Become a responsible professional having social, economic and administrative considerations.
6. Make own career goals and personal aspirations

Subject Code &Name - 314456: Computer Network Security Lab

Course Objectives

1. To design and implement small size network and to understand various networking commands.

2. To learn various client/server environments to use application layer protocols.
3. To understand network layer routing protocols and its implementations.
4. To understand the network security by using public key cryptography algorithms.

Course Outcomes

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

1. Design and configure small size network and associated networking commands.
2. Understand various client/server environments to use application layer protocols.
3. Use basic cryptographic techniques in software and system design.
4. Apply methods for authentication, access control, intrusion detection.

Subject Code & Name - 314457: DS & BDA Lab

Course Objectives

1. To understand Big data primitives and fundamentals.
2. To understand the different Big data processing techniques.
3. To understand and apply the Analytical concept of Big data using Python.
4. To understand different data visualization techniques for Big Data.
5. To understand the application and impact of Big Data.
6. To understand emerging trends in Big data analytics.

Course Outcomes

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

1. Apply Big data primitives and fundamentals for application development.
2. Explore different Big data processing techniques with use cases.
3. Apply the Analytical concept of Big data using Python.
4. Visualize the Big Data using Tableau.
5. Design algorithms and techniques for Big data analytics.
6. Design and develop Big data analytic application for emerging trends.

Subject Code & Name - 314458: Laboratory Practice-II (Web Application Development)

Course Objectives

1. To understand basic concepts of web programming and scripting languages.
2. To learn Version Control Environment.
3. To learn front end technologies and back end technologies.
4. To understand mobile web development.
5. To comprehend web application deployment.

Course Outcomes

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

1. Develop Static and Dynamic responsive website using technologies HTML, CSS, Bootstrap and AJAX.
2. Create Version Control Environment.
3. Develop an application using front end and backend technologies.
4. Develop mobile website using JQuery Mobile.
5. Deploy web application on cloud using AWS.

Subject Code & Name - 314458: Lab Practice – II (Artificial Intelligence)

Course Objectives

1. To develop real world problem solving ability
2. To enable the student to apply AI techniques in applications which involve perception, reasoning and planning
3. To work in team to build industry compliant AI applications

Course Outcomes

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

1. Evaluate and apply core knowledge of AI on various real world problems.
2. Illustrate and demonstrate AI tools for different dynamic applications.

Subject Code &Name - 314458: Lab Practice –II (Cyber Security)

Course Objectives

1. To develop and understand the placement of packet-sniffer in networking and internetworking environment.
2. To implement the cyber-attacks.
3. To implement intrusion detection and basic mail spamming.

Course Outcomes

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

1. To know the different guidelines for Packet Sniffing in networking and internetworking environment.
2. To know the different types of cyber-attacks and will be able analyze the attacks.
3. Apply the knowledge of IDS to secure network and performing analysis of IDS attack on network.

Subject Code &Name - 314458: Laboratory Practice-II (Cloud Computing)

Course Objectives

1. To develop web applications in cloud.
2. To learn the design and development process involved in creating a cloud based application.

Course Outcomes

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

1. To design and develop cloud-based applications.
2. To Simulate a cloud scenario using Cloud Sim.
3. To design and deploy web applications in cloud environment.

Subject Code &Name - 314458: Laboratory Practice-II (Software Modeling Design)

Course Objectives

1. To teach the student Unified Modeling Language (UML 2.0)
2. To teach the student how to identify different software artifacts at analysis and design phase.
3. To explore and analyze use case modeling.
4. To explore and analyze domain/ class modeling.
5. To develop a system with design and modeling concepts.

Course Outcomes

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

1. Develop use case model with the help of UML notations.
2. Develop and implement analysis model and design model.
3. Develop and implement Interaction and behavior Model.

Subject Code &Name - 314459 (A): Green and Unconventional Energy

Course Objectives

1. To know the importance of the energy and the the basic infrastructures for the economic development of the country.
2. To know about the most important renewable energy resources and the technologies for harnessing these resources within the framework of a broad range of simple to state-of -the-art energy systems.
3. To understand the application of non-conventional energy technologies.

Course Outcomes

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

1. List and explain the main sources of energy and their primary applications in the India, and The world.

2. Describe the challenges and problems associated with the use of various energy sources and It conservation.
3. List and describe the primary renewable energy resources and technologies.
4. Collect and organize information on renewable energy technologies as a basis for further analysis and evaluation.

CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Third Year Mechanical Engineering (2019 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name -302041: Numerical and Statistical Methods

Course Objectives

1. UNDERSTAND applications of systems of equations and solve mechanical engineering applications.
2. APPLY differential equations to solve the applications in the domain of fluid mechanics, structural, etc.
3. LEARN numerical integration techniques for engineering applications.
4. COMPARE the system's behavior for the experimental data.
5. INTERPRET Statistical measures for quantitative data.
6. ANALYZE datasets using probability theory and linear algebra.

Course Outcomes

On completion of the course the learner will be able to;

1. SOLVE system of equations using direct and iterative numerical methods.
2. ESTIMATE solutions for differential equations using numerical techniques.
3. DEVELOP solution for engineering applications with numerical integration.
4. DESIGN and CREATE a model using a curve fitting and regression analysis.
5. APPLY statistical Technique for quantitative data analysis.
6. DEMONSTRATE the data, using the concepts of probability and linear algebra.

Subject Code & Name -302042: Heat and Mass Transfer

Course Objectives

1. IDENTIFY the laws for different modes of heat transfer.
2. UNDERSTAND the properties and economics of thermal insulation and ANALYZE heat transfer through fins and thermal systems with lumped heat capacitance.
3. ANALYZE the natural and forced convective mode of heat transfer in various geometric configurations.
4. UNDERSTAND AND REALIZE various laws with their interrelations and analyze Radiation heat transfer in black and grey bodies/surfaces with or without radiation shields.
5. UNDERSTAND the fundamentals and laws of mass transfer and its applications.
6. ANALYZE various performance parameters for existing heat exchanger and DEVELOP methodologies for designing a heat exchanger under prescribed conditions and for a particular application, with references TEMA standards

Course Outcomes

On completion of the course, learner will be able to

1. ANALYZE & APPLY the modes of heat transfer equations for one dimensional thermal system.
2. DESIGN a thermal system considering fins, thermal insulation and & Transient heat conduction.
3. EVALUATE the heat transfer rate in natural and forced convection & validate with experimentation results.
4. INTERPRET heat transfer by radiation between objects with simple geometries, for black and grey surfaces.

5. ABILITY to analyze the rate of mass transfer using Fick's Law of Diffusion and understands mass diffusion in different coordinate systems.
6. DESIGN & ANALYSIS of heat transfer equipments and investigation of its performance

Subject Code & Name -302043: Design of Machine Elements

Course Objectives

1. UNDERSTAND the various design considerations, design procedure and select materials for a specific application
2. CALCULATE the stresses in machine components due to various types of loads and failure
3. ANALYZE machine components subjected to variable loading for finite and infinite life
4. DESIGN various machine components such as shafts, couplings, keys, screws, joints, springs

Course Outcomes

On completion of the course, learner will be able to

1. DESIGN AND ANALYZE the cotter and knuckle Joints, levers and components subjected to eccentric loading.
2. DESIGN shafts, keys and couplings under static loading conditions.
3. ANALYZE different stresses in power screws and APPLY those in the procedure to design screw jack.
4. EVALUATE dimensions of machine components under fluctuating loads.
5. EVALUATE & INTERPRET the stress developed on the different type of welded and threaded joints.
6. APPLY the design and development procedure for different types of springs.

Subject Code & Name -302044: Mechatronics

Course Objectives

1. UNDERSTAND the key elements of mechatronics, principle of sensor and its characteristics.
2. UNDERSTAND the concept of signal processing and use of interfacing systems such as ADC, DAC, Digital I/O.
3. UNDERSTAND the block diagram representation and concept of transfer function.
4. UNDERSTAND the system modeling and analysis in frequency domain.
5. UNDERSTAND the system modeling and analysis in time domain, controller modes and its industrial applications..
6. UTILIZE the concepts of PLC system and its ladder programming and significance of PLC system in industrial application

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE key elements of mechatronics, principle of sensor and its characteristics.
2. UTILIZE concept of signal processing and MAKE use of interfacing systems such as ADC, DAC, Digital I/O.
3. DETERMINE the transfer function by using block diagram reduction technique.
4. EVALUATE Poles and Zero, frequency domain parameter for mathematical modeling for mechanical system.
5. APPLY the concept of different controller modes to an industrial application.
6. DEVELOP the ladder programming for industrial application.

Subject Code & Name -302045-A: Advanced Forming & Joining Processes

Course Objectives

1. UNDERSTAND advances in sheet metal forming operations
2. UNDERSTAND the advanced special metal forming processes.
3. UNDERSTAND weld metallurgy and weld characterization techniques.
4. UNDERSTAND and describe various advanced solid state welding processes.
5. CLASSIFY AND DESCRIBE various advanced welding processes.

6. KNOW about sustainable manufacturing and its role in manufacturing industry.

Course Outcomes

On completion of the course, learner will be able to

1. ANALYSE the effect of friction in metal forming deep drawing and IDENTIFICATION of surface defects and their remedies in deep drawing operations
2. ASSESS the parameters for special forming operation and SELECT appropriate special forming operation for particular applications
3. ANALYSE the effect of HAZ on microstructure and mechanical properties of materials
4. CLASSIFY various solid state welding process and SELECT suitable welding processes for particular applications
5. CLASSIFY various advanced welding process and SELECT suitable welding processes for particular applications.
6. INTERPRET the principles of sustainable manufacturing and its role in manufacturing industry.

Subject Code & Name - 302045-B: Machining Science & Technology

Course Objectives

1. KNOW about fundamentals of metal cutting process, tool wear and tool life.
2. IMPART the knowledge of machining phenomenon like milling, gear and thread manufacturing, grinding, super finishing, etc.
3. UNDERSTAND the basic concepts, importance and functions of Jigs, Fixtures.
4. PREPARE list of operations, tools, set of manufacturing instructions and selection of quality assurance method.
5. GENERATE CNC program for appropriate machining processes like turning and milling.

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE metal cutting principles and mechanics of metal cutting and tool life.
2. DESCRIBE features of gear and thread manufacturing processes.
3. SELECT appropriate grinding wheel and demonstrate the various surface finishing processes.
4. SELECT appropriate jigs/fixtures and to draw the process plan for a given component.
5. SELECT & EVALUATE various parameters of process planning.
6. GENERATE CNC program for Turning / Milling processes and generate tool path using CAM software.

Subject Code & Name - 302046: Digital Manufacturing Laboratory

Course Objectives

1. ACQUIRE skills to handle conventional machines and CNC machine for manufacturing of a component.
2. PREPARE manual part program for given component as per ISO standards.
3. ACCUSTOM skills of Additive manufacturing technology.
4. APPRECIATE the influence of cutting tool parameters on the performance.
5. APPLY Digital Manufacturing tools for process simulation of manufacturing processes.
6. SELECT appropriate type of jigs and fixtures for a given component

Course Outcomes

On completion of the course, learner will be able to

1. DEVELOP a component using conventional machines, CNC machines and Additive Manufacturing Techniques.
2. ANALYZE cutting tool parameters for machining given job.
3. DEMONSTRATE simulation of manufacturing process using Digital Manufacturing Tools.
4. SELECT and DESIGN jigs and Fixtures for a given component.
5. DEMONSTRATE different parameters for CNC retrofitting and reconditioning.

Subject Code &Name - 302047: Skill Development

Course Objectives

1. INTRODUCE the skills required in an industry such as design, development, assembly & disassembly.
2. DEVELOP the skills required for fault diagnose of engine and transmission of different automotive and various home appliances.
3. ESTABLISH the skills required for maintenance of any machine tool.
4. CREATE awareness about industrial environment.

Course Outcomes

On completion of the course, learner will be able to

1. APPLY & DEMONSTRATE procedure of assembly & disassembly of various machines.
2. DESIGN & DEVELOP a working/model of machine parts or any new product.
3. EVALUATE fault with diagnosis on the machines, machine tools and home appliances.
4. IDENTIFY & DEMONSTRATE the various activities performed in an industry such as maintenance, design of components, material selection.

SEM II

Subject Code &Name -302049: Artificial Intelligence & Machine Learning

Course Objectives

1. ACQUAINT with fundamentals of artificial intelligence and machine learning.
2. LEARN feature extraction and selection techniques for processing data set.
3. UNDERSTAND basic algorithms used in classification and regression problems.
4. OUTLINE steps involved in development of machine learning model.
5. FAMILIARIZE with concepts of reinforced and deep learning.
6. IMPLEMENT AND ANALYZE machine learning model in mechanical engineering problems.

Course Outcomes

On completion of the course, learner will be able to

1. DEMONSTRATE fundamentals of artificial intelligence and machine learning.
2. APPLY feature extraction and selection techniques.
3. APPLY machine learning algorithms for classification and regression problems.
4. DEVISE AND DEVELOP a machine learning model using various steps.
5. EXPLAIN concepts of reinforced and deep learning.
6. SIMULATE machine learning model in mechanical engineering problems.

Subject Code &Name -302050: Computer Aided Engineering

Course Objectives

1. UNDERSTAND the basic concepts of Computer Aided Engineering (CAE) and CHARACTERISTICS of various elements required for analysis.
2. NURTURE students about the discretization process and criteria for quality mesh.
3. UNDERSTAND the approaches of Finite Element Method (FEM) and to find displacement and stresses over the body.
4. DEVELOP the knowledge and skills needed to effectively evaluate the results using Finite Element Analysis (FEA).
5. APPLY computational technique to solve complex solid mechanics problems and its loading states.
6. STUDY the applications of CAE in the various domains of the Mechanical Engineering.

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE the use of CAE tools and DESCRIBE the significance of shape functions in finite element formulations.
2. APPLY the various meshing techniques for better evaluation of approximate results.
3. APPLY material properties and boundary condition to SOLVE 1-D and 2-D element stiffness matrices to obtain nodal or elemental solution.
4. ANALYZE and APPLY various numerical methods for different types of analysis.
5. EVALUATE and SOLVE non-linear and dynamic analysis problems by analyzing the results obtained from analytical and computational method.
6. GENERATE the results in the form of contour plot by the USE of CAE tool.

Subject Code &Name -302051: Design of Transmission Systems

Course Objectives

1. APPLY fundamentals for the design and/or selection of elements in transmission systems.
2. UNDERSTAND the philosophy that real engineering design problems are open-ended and challenging.
3. DEMONSTRATE design skills for the problems in real life industrial applications.
4. DEVELOP an attitude of team work, critical thinking, communication, planning and scheduling through design projects.

5. PERCEIVE about safety, ethical, legal, and other societal constraints in execution of their design projects.
6. BUILD a holistic design approach to find out pragmatic solutions to realistic domestic and industrial problems

Course Outcomes

On completion of the course, learner will be able to

1. APPLY the principle of Spur & Helical gear design for industrial application and PREPARE a manufacturing drawing with the concepts of GD&T.
2. EXPLAIN and DESIGN Bevel & Worm gear considering design parameters as per design standards.
3. SELECT&DESIGN Rolling and Sliding Contact Bearings from manufacturer's catalogue for a typical application considering suitable design parameters.
4. DEFINE and DESIGN various types of Clutches, Brakes, used in automobile.
5. APPLY various concept to DESIGN Machine Tool Gear box, for different applications
6. ELABORATE various modes of operation, degree of hybridization and allied terms associated with hybrid electric vehicles.

Subject Code &Name -302052-A: Composite Materials

Course Objectives

1. DESCRIBE what are composite materials and their differences with respect to conventional materials.
2. COMPREHEND the challenges associated with Polymer Matrix composites.
3. UNDERSTAND the requirement of Metal Matrix Composites
4. RECOGNIZE design and properties aspect of composites
5. UNDERSTAND the testing, inspection and standard in Composites
6. ORIENT to the specific Application of Composites

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE & COMPARE composites with traditional materials.
2. IDENTIFY & ESTIMATE different parameters of the Polymer Matrix Composite
3. CATEGORISE and APPLY Metal Matrix Process from possessions landscape.
4. DETERMINE volume/weight fraction and strength of Composites.
5. SELECT appropriate testing and inspection method for composite materials.
6. SELECT composites materials for various applications.

Subject Code &Name -302052-B: Surface Engineering

Course Objectives

1. DEVELOP fundamental understanding and role of materials to allow surface selection for mechanical contact surfaces
2. UNDERSTAND surface modification and coating method to enhance surface performance
3. RECOGNIZE method for testing surface properties

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE the basic's principle & mechanism of surface degradation.
2. ANALYSE & SELECT correct corrosion prevention techniques for a different service condition.
3. DEMONSTRATE the role of surface engineering of materials to modify/improve the surface properties.
4. SELECT the suitable surface heat treatments to improve the surface properties.
5. APPLY the surface modification technique to modify surface properties.

6. ANALYSE & EVALUTE various surface coating defects using various testing/characterization method.

Subject Code &Name -302053: Measurement Laboratory

Course Objectives

1. DEVELOP necessary skills for calibration and testing of instruments
2. APPLY fundamentals of measuring methods by collecting data ,analysis and interpretation
3. APPLY knowledge of Designing limiting gauges
4. APPLY knowledge of Electronic/Electrical measuring instruments

Course Outcomes

On completion of the course, learner will be able to

1. EVALUATE causes of errors in Verniercalipers, micrometers by performing experiments in standard metrological conditions, noting deviations at actual and by plotting cause and effect diagram, to reduce uncertainty in measurement.
2. ANALYZE strain measurement parameters by taking modulus of elasticity in consideration to acknowledge its usage in failure detection and force variations.
3. EXAMINE surface Textures, surface finish using equipment's like Talysurf and analyze surface finish requirements of metrological equipment's like gauges, jaws of verniercalipers, micrometers, magnifying glasses of height gauge and more, to optimize surface finish accuracy requirements and cost of measurement.
4. MEASURE the dimensional accuracy using Comparator and limit gauges and appraise their usage in actual measurement or comparison with standards set to reduce measurement lead time.
5. PERFORM Testing of Flow rate, speed and temperature measurements and their effect on performance in machines and mechanisms like hydraulic or pneumatic trainers, lathe machine etc. to increase repeatability and reproducibility.
6. COMPILE the information of opportunities of entrepreneurships/business in various sectors of metrology like calibrations, testing, coordinate and laser metrology etc in an industry visit report.

Subject Code &Name -302054: Fluid Power & Control Laboratory

Course Objectives

1. UNDERSTAND working principles of control devices and accessories.
2. SELECT different components from manufactures' catalogues.
3. DEMONSTRATE the capabilities to simulate and design fluid power systems.
4. UNDERTAKE digitalization of fluid power system.

Course Outcomes

On completion of the course, learner will be able to

1. DEFINE working principle of components used in hydraulic and pneumatic systems.
2. IDENTIFY & EXPLAIN various applications of hydraulic and pneumatic systems.
3. SELECT an appropriate component required for hydraulic and pneumatic systems using manufactures' catalogues.
4. SIMULATE & ANALYSE various hydraulic and pneumatic systems for industrial/mobile applications.
5. DESIGN a hydraulic and pneumatic system for the industrial applications.
6. DESIGN & DEMONSTRATE various IoT, PLC based controlling system using hydraulics and pneumatic.

Subject Code &Name -302055: Internship/Mini project

Course Objectives

Internship provides an excellent opportunity to learner to see understand the conceptual aspects learned in classes and deployed into the practical world. Industry/on project experience provides much more professional experience as value addition to classroom teaching.

1. To encourage and provide opportunities for students to get professional/personal experience through internships.
2. To learn and understand real life/industrial situations.
3. To get familiar with various tools and technologies used in industries and their applications.
4. To nurture professional and societal ethics.
5. To create awareness of social, economic and administrative considerations in the working environment of industry organizations.

Course Outcomes

On completion of the course, learners should be able to

1. DEMONSTRATE professional competence through industry internship.
2. APPLY knowledge gained through internships to complete academic activities in a professional manner.
3. CHOOSE appropriate technology and tools to solve given problem.
4. DEMONSTRATE abilities of a responsible professional and use ethical practices in day to day life.
5. DEVELOP network and social circle, and DEVELOPING relationships with industry people.
6. ANALYZE various career opportunities and DECIDE career goals.



CAYMET's
Siddhant College of Engineering
Savitribai Phule Pune University, Pune
Final Year Civil Engineering (2015 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name-401001 Environmental Engineering II

Course Objectives

1. To learn the basics of sewage composition and its characteristics
2. To depict the information about various sewage treatment processes
3. To provide the adequate information on various disposal standards for industrial effluents
4. To study the information about air pollution and its effects
5. To understand the knowledge about solid waste generation and disposal methods

Course Outcomes

1. On completion of the course, the students will be able to:
2. Determine the sewage characteristics and design various sewage treatment plants
3. Analyze the status of surface water and ground water quality and the remediation technologies
4. Carry out municipal water and wastewater treatment system design and operation
5. Manage hazardous wastes, risk assessment and treatment technologies
6. Apply environmental treatment technologies and design processes

Subject Code & Name – 401002 Transportation Engineering

Course Objectives

1. To understand the importance of transportation and characteristics of road transport
2. To know about the history of highway development, surveys and classification of roads
3. To study about the geometric design of highways
4. To study about traffic characteristics and design of intersections
5. To know about the pavement materials and design

Course Outcomes

1. Carry out surveys involved in planning and highway alignment
2. Design cross section elements, sight distance, horizontal and vertical alignment
3. Implement traffic studies, traffic regulations and control, and intersection design

4. Determine the characteristics of pavement materials
5. Design flexible and rigid pavements as per IRC

Subject Code &Name – 401003 Structural Design and Drawing III

Course Objectives

1. To learn the principles, materials, methods and systems of prestressing
2. To know the different types of losses and deflection of prestressed members
3. To learn the design of prestressed concrete beams for flexural, shear and tension and to calculate ultimate flexural strength of beam
4. To learn the design of anchorage zones, composite beams, analysis and design of continuous beam
5. To learn the design of water tanks

Course Outcomes

1. Design a prestressed concrete beam accounting for losses
2. Design the anchorage zone for post tensioned members
3. Design composite members
4. Design continuous beams
5. Design water tanks

Subject Code &Name – 401004 Elective I Advanced Concrete Technology

Course Outcomes

Student shall be able to

1. Identify Quality Control tests on concrete making materials
2. Understand the behavior of fresh and hardened concrete
3. Understand Mechanical properties of concrete
4. Use various additives & admixtures of concrete
5. Design concrete mixes as per IS and ACI codes
6. Understand the durability requirements of concrete

Subject Code &Name – 401005 Elective II Earthquake Engineering

Course Outcomes

Student shall be able to

1. Understand earth geology, movements of the plates, earthquakes
2. Calculate the magnitude & intensity of the earthquake

3. Understand the concept of Earthquake resistant design of structures
4. Perform the seismic analysis of multistoried building
5. Understand the impact of special aspects of building on seismic response
6. Understand the requirement of ductile detailing in frame members

SEM II

Subject Code &Name -401007 Dams and Hydraulic Structures

Course Objectives

1. To understand the basic types of irrigation, irrigation standards and crop water assessment
2. To study the different aspects of design of hydraulic structures
3. To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works
4. To understand the analysis of seepage and hydraulic jump
5. To design different types of dams

Course Outcomes

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

1. Assess the irrigation needs of crops
2. Design weirs on pervious foundation
3. Design gravity dam and earthen dam
4. Design the canal systems
5. Select and design canal fall

Subject Code &Name -401008 Quantity Surveying, Contracts and

Tenders

Course Objectives

1. To know the importance of preparing the types of estimates under different conditions
2. To know about the rate analysis and bill preparations
3. To study about the specification writing
4. To understand the valuation of land and buildings

Course Outcomes

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

1. Apply different types of estimates in different situations
2. Carry out analysis of rates and bill preparation at different locations
3. Demonstrate the concepts of specification writing
4. Carry out valuation of assets

Subject Code &Name -401009 Elective III Air Pollution and control

Course Outcomes:

Student shall be able to

1. To explain air pollution sources, effects and control measures.
2. To define Environmental Impact Assessment, explain its methods and understand latest trend
3. Develop environmental awareness and various policies.
4. Suggest and implement various air pollution control techniques.

Subject Code &Name -401010 Elective IV Green Building Technology

Course Outcomes:

Student shall be able to

1. Gain a broad understanding & explain the basic concepts of Green Building
2. Identify, formulate & explore use various green construction materials, processes and systems
3. Apply knowledge of local, national and international rating systems while designing green buildings
4. Apply modern green engineering tools, techniques & skills necessary for engineering practice in energy efficiency concept during execution.
5. Use various methods of energy and water conservation for development of sustainable building.
6. Explain the contemporary issues and development associated with green building



CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Fourth Year Computer Engineering (2015 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Program Educational Objectives

1. To prepare globally competent graduates having strong fundamentals, domain knowledge, updated with modern technology to provide the effective solutions for engineering problems.
2. To prepare the graduates to work as a committed professional with strong professional ethics and values, sense of responsibilities, understanding of legal, safety, health, societal, cultural and environmental issues.
3. To prepare committed and motivated graduates with research attitude, lifelong learning, investigative approach, and multidisciplinary thinking.
4. To prepare the graduates with strong managerial and communication skills to work effectively as individual as well as in teams.

Program Outcomes

1. To apply knowledge of mathematics, science, engineering fundamentals, problem solving skills, algorithmic analysis and mathematical modeling to the solution of complex engineering problems.
2. To analyze the problem by finding its domain and applying domain specific skills
3. To understand the design issues of the product/software and develop effective solutions with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
4. To find solutions of complex problems by conducting investigations applying suitable techniques.
5. To adapt the usage of modern tools and recent software.
6. To contribute towards the society by understanding the impact of Engineering on global aspect.
7. To understand environment issues and design a sustainable system.
8. To understand and follow professional ethics.

Subject Code & Name -410241 High Performance Computing

Course Objectives

1. To study parallel computing hardware and programming models
2. To be conversant with performance analysis and modelling of parallel programs
3. To understand the options available to parallelize the programs

4. To know the operating system requirements to qualify in handling the parallelization

Course Outcomes

On completion of the course, learner will be able to

1. Describe different parallel architectures, inter-connect networks, programming models
2. Develop an efficient parallel algorithm to solve given problem
3. Analyze and measure performance of modern parallel computing systems
4. Build the logic to parallelize the programming task

Subject Code &Name -410242 Artificial Intelligence and Robot

Course Objectives

1. To understand the concept of Artificial Intelligence (AI)
2. To learn various peculiar search strategies for AI
3. To acquaint with the fundamentals of mobile robotics
4. To develop a mind to solve real world problems unconventionally with optimality

Course Outcomes

On completion of the course, learner will be able to

1. Identify and apply suitable Intelligent agents for various AI applications
2. Design smart system using different informed search / uninformed search or heuristic approaches.
3. Identify knowledge associated and represent it by ontological engineering to plan a strategy to solve given problem.
4. Apply the suitable algorithms to solve AI problems.

Subject Code &Name -410243 Data Analytics

Course Objectives

1. To develop problem solving abilities using Mathematics
2. To apply algorithmic strategies while solving problems
3. To develop time and space efficient algorithms
4. To study algorithmic examples in distributed, concurrent and parallel environments

Course Outcomes

On completion of the course, learner will be able to

1. Write case studies in Business Analytic and Intelligence using mathematical models
2. Present a survey on applications for Business Analytic and Intelligence
3. Provide problem solutions for multi-core or distributed, concurrent/Parallel environments

Subject Code &Name -Elective I-410244(D) Data Mining and Warehousing

Course Objectives

1. To understand the fundamentals of Data Mining
2. To identify the appropriateness and need of mining the data
3. To learn the pre-processing, mining and post processing of the data
4. To understand various methods, techniques and algorithms in data mining

Course Outcomes

On completion of the course, learner will be able to

1. Apply basic, intermediate and advanced techniques to mine the data
2. Analyze the output generated by the process of data mining
3. Explore the hidden patterns in the data
4. Optimize the mining process by choosing best data mining technique

Subject Code &Name - Elective II- 410245(B) Software Testing and Quality Assurance

Course Objectives

1. Introduce basic concepts of software testing
2. Understand white box, block box, object oriented, web based and cloud testing
3. Know in details automation testing and tools used for automation testing
4. Understand the importance of software quality and assurance software systems development.

Course Outcomes

On completion of the course, learner will be able to

1. Describe fundamental concepts in software testing such as manual testing, automation testing and software quality assurance.
2. Design and develop project test plan, design test cases, test data, and conduct test operations
3. Apply recent automation tool for various software testing for testing software
4. Apply different approaches of quality management, assurance, and quality standard to software system
5. Apply and analyze effectiveness Software Quality Tools

Subject Code &Name - 410246-Laboratory Practice I

Course Objectives and Outcomes

1. Practical hands on is the absolute necessity as far as employability of the learner is concerned.

2. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.

Subject Code &Name: - 410247-Laboratory Practice II

Course Objectives and Outcomes

1. Practical hands on is the absolute necessity as far as employability of the learner is concerned.
2. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.
3. Enough choice is provided to the learner to choose an elective of one's interest.

Subject Code &Name: - 410248 Project Work Stage I

Course Objectives

1. To Apply the knowledge for solving realistic problem
2. To develop problem solving ability
3. To Organize, sustain and report on a substantial piece of team work over a period of several months
4. To Evaluate alternative approaches, and justify the use of selected tools and methods
5. To Reflect upon the experience gained and lessons learned
6. To Consider relevant social, ethical and legal issues
7. To find information for yourself from appropriate sources such as manuals, books, research journals and from other sources, and in turn increase analytical skills.
8. To Work in TEAM and learn professionalism

Course Outcomes

On completion of the course, learner will be able to

1. Solve real life problems by applying knowledge.
2. Analyze alternative approaches, apply and use most appropriate one for feasible solution.
3. Write precise reports and technical documents in a nutshell.
4. Participate effectively in multi-disciplinary and heterogeneous teams exhibiting team work, Inter-personal relationships, conflict management and leadership quality.

Subject Code &Name: - 410249 Audit Course-I: Entrepreneurship Development

Course Objectives

1. To introduce the aspects of Entrepreneurship
2. To acquaint with legalities in product development

3. To understand IPR, Trademarks, Copyright and patenting
4. To know the facets of functional plans, Entrepreneurial Finance and Enterprise Management

Course Outcomes

1. Understand the legalities in product development
2. Undertake the process of IPR, Trademarks, Copyright and patenting
3. Understand and apply functional plans
4. Manage Entrepreneurial Finance
5. Inculcate managerial skill as an entrepreneur

SEM II

Subject Code & Name -410250 Machine Learning

Course Objectives

1. To understand human learning aspects and relate it with machine learning concepts.
2. To understand nature of the problem and apply machine learning algorithm.
3. To find optimized solution for given problem.

Course Outcomes

On completion of the course, learner will be able to

1. Distinguish different learning-based applications
2. Apply different pre-processing methods to prepare training data set for machine learning.
3. Design and implement supervised and unsupervised machine learning algorithm.
4. Implement different learning models
5. Learn Meta classifiers and deep learning concepts

Subject Code & Name -410251 Information and Cyber Security

Course Objectives

1. To offer an understanding of principle concepts, central topics and basic approaches in information and cyber security.
2. To know the basics of cryptography.
3. To acquire knowledge of standard algorithms and protocols employed to provide confidentiality, integrity and authenticity
4. To enhance awareness about Personally Identifiable Information (PII), Information Management, cyber forensics

Course Outcomes

On completion of the course, learner will be able to

1. Gauge the security protections and limitations provided by today's technology.
2. Identify information security and cyber security threats.
3. Analyze threats in order to protect or defend it in cyberspace from cyber-attacks.
4. Build appropriate security solutions against cyber-attacks

Subject Code & Name - Elective III 410252(C) Embedded and Real Time Operating Systems

Course Objectives

1. To understand a typical embedded system and its constituents

2. To learn the selection process of processor and memory for the embedded systems
3. To learn communication buses and protocols used in the embedded and real-time systems
4. To understand real-time operating system (RTOS) and the types of RTOS
5. To learn various approaches to real-time scheduling
6. To learn software development process and tools for RTOS applications

Course Outcomes

On completion of the course, learner will be able to

1. Recognize and classify embedded and real-time systems
2. Explain communication bus protocols used for embedded and real-time systems
3. Classify and exemplify scheduling algorithms
4. Apply software development process to a given RTOS application
5. Design a given RTOS based application

Subject Code &Name - Elective III 410252(D) Soft Computing and Optimization Algorithms

Course Objectives

1. To know the basics behind the Design and development intelligent systems in the framework of soft computing
2. To acquire knowledge of Artificial Neural Networks Fuzzy sets, Fuzzy Logic, Evolutionary computing and swarm intelligence
3. To explore the applications of soft computing
4. To understand the need of optimization

Course Outcomes

On completion of the course, learner will be able to

1. Apply soft computing methodologies, including artificial neural networks, fuzzy sets, fuzzy logic, fuzzy inference systems and genetic algorithms
2. Design and development of certain scientific and commercial application using computational neural network models, fuzzy models, fuzzy clustering applications and genetic algorithms in specified applications.

Subject Code &Name - Elective IV 410253(C) Cloud Computing

Course Objectives

1. To understand cloud computing concepts
2. To study various platforms for cloud computing

3. To explore the applications based on cloud computing

Course Outcomes

On completion of the course, learner will be able to

1. To install cloud computing environments.
2. To develop any one type of cloud
3. To explore future trends of cloud computing

Subject Code &Name – 410254 Laboratory Practice III

Course Objectives and Outcomes:

Practical hands on is the absolute necessity as far as employability of the learner is concerned. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the core courses.

Subject Code &Name – 410255 Laboratory Practice IV

Course Objectives and Outcomes:

1. Practical hands on is the absolute necessity as far as employability of the learner is concerned.
2. The presented course is solely intended to enhance the competency by undertaking the laboratory assignments of the elective courses.
3. Enough choice is provided to the learner to choose an elective of one's interest

Subject Code &Name-410256 Project Work Stage II

Course Objectives

1. To follow SDLC meticulously and meet the objectives of proposed work
2. To test rigorously before deployment of system
3. To validate the work undertaken
4. To consolidate the work as furnished report.

Course Outcomes

On completion of the course, student will be able to–

1. Show evidence of independent investigation
2. Critically analyze the results and their interpretation.
3. Report and present the original results in an orderly way and placing the open questions in the right perspective. Link techniques and results from literature as well as actual research and future research lines with the research.

4. Appreciate practical implications and constraints of the specialist subject

Subject Code &Name- 410257 Audit Course- I: Business Intelligence

Course Objectives

1. To understand the concept of Business Intelligence
2. To know the details of Decision Support System
3. To inculcate the concepts of Data Warehousing
4. To understand the basics of design and management of BI systems

Course Outcomes

On completion of the course, student will be able to–

1. Apply the concepts of Business Intelligence in real world application
2. Explore and use the data warehousing wherever necessary
3. Design and manage practical BI systems

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CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Fourth Year Electronics & Telecommunication Engineering (2015 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code &Name -404181 VLSI Design & Technology

Program Outcome

1. To explore HDL and related design approach.
2. To nurture students with CMOS circuit designs.
3. To realize importance of testability in logic circuit design.
4. To overview ASIC issues and understand PLD architectures with advanced features.

Course Outcomes

On completion of the course, student will be able to-

1. Write effective HDL coding for digital design.
2. Apply knowledge of real time issues in digital design.
3. Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
4. Design CMOS circuits for specified applications.
5. Analyze various issues and constraints in design of an ASIC
6. Apply knowledge of testability in design and build self test circuit.

Subject Code &Name -404182 Computer Networks & Security

Program Outcome

1. To understand state-of-the-art in network protocols, architectures, and applications
2. To provide students with a theoretical and practical base in computer networks issues
3. To outline the basic network configurations
4. To understand the transmission methods underlying LAN and WAN technologies.
5. To understand security issues involved in LAN and Internet.

Course Outcomes

On completion of the course, student will be able to-

1. Understand fundamental underlying principles of computer networking
2. Describe and analyze the hardware, software, components of a network and their interrelations.

3. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies
4. Have a basic knowledge of installing and configuring networking applications.
5. Specify and identify deficiencies in existing protocols, and then go onto select new and better protocols.
6. Have a basic knowledge of the use of cryptography and network security.

Subject Code &Name -404183 Radiation and Microwave Techniques

Program Outcome

1. To introduce fundamental theory of radiation and microwaves.
2. To understand design principles of various radiating elements.
3. To understand theory of passive and active components of microwave systems.
4. To learn microwave measurement techniques.

Course Outcomes

On completion of the course, student will be able to-

1. Differentiate various performance parameters of radiating elements.
2. Analyze various radiating elements and arrays.
3. Apply the knowledge of waveguide fundamentals in design of transmission lines.
4. Design and set up a system consisting of various passive microwave components.
5. Analyze tube based and solid state active devices along with their applications.
6. Measure various performance parameters of microwave components.

Subject Code &Name -Elective I 404184 Digital Image and Video Processing

Program Outcome

1. Understand the fundamental concepts of Digital Image Processing with basic relationship of pixels and mathematical operations on 2-D data.
2. Learn design and integrate image enhancement and image restoration techniques
3. Understand object segmentation and image analysis techniques
4. Learn the need for effective use of resources such as storage and bandwidth and ways to provide effective use of them by data compression techniques
5. Learn basic concepts of video processing

Course Outcomes

On completion of the course, student will be able to-

1. Develop and implement basic mathematical operations on digital images.

2. Analyze and solve image enhancement and image restoration problems.
3. Identify and design image processing techniques for object segmentation and recognition.
4. Represent objects and region of the image with appropriate method.
5. Apply 2-D data compression techniques for digital images.
6. Explore video signal representation and different algorithm for video processing

Subject Code &Name - Elective I 404184 Embedded systems and RTOS

Program Outcome

1. To understand and able to design an application specific systems.
2. To develop implementation skill for application specific systems.
3. To understand design and implementation of real time system using RTOS.
4. To understand open source platform for embedded system

Course Outcomes

On completion of the course, student will be able to-

1. Understand design of embedded system
2. Use RTOS in embedded application
3. Use modern architecture for embedded system
4. Use Linux for embedded system development
5. Use open platform for embedded system development

Subject Code &Name - Elective II 404185 Electronic Product Design

Program Outcome

1. To understand the stages of product (hardware/ software) design and development.
2. To learn the different considerations of analog, digital and mixed circuit design.
3. To be acquainted with methods of PCB design and different tools used for PCB Design.
4. To understand the importance of testing in product design cycle.
5. To understand the processes and importance of documentation.

Course Outcomes

After successfully completing the course students will be able to-

1. Understand various stages of hardware, software and PCB design.
2. Importance of product test & test specifications.
3. Special design considerations and importance of documentation.

SEM II

Subject Code &Name: - 404189 Mobile Communication

Program Outcome

1. To understand switching techniques for voice and data traffic.
2. To nurture students with knowledge of traffic engineering to design networks.
3. To realize importance of cellular concepts and its propagation mechanism.
4. To understand architecture of GSM system.
5. To overview 4G LTE and 5G technologies.

Course Outcomes

1. After successfully completing the course students will be able to-
2. Apply the concepts of switching technique and traffic engineering to design multistage networks.
3. Explore the architecture of GSM.
4. Differentiate thoroughly the generations of mobile technologies.

Subject Code &Name: - 404190 Broadband Communication Systems

Program Outcome

1. To comprehend the three primary components of a fiber optic communication system.
2. To understand the system design issues and the role of WDM components in advanced light wave systems.
3. To understand the basics of orbital mechanics and the look angles from ground stations to the satellite.
4. To apply subject understanding in Link Design.

Course Outcomes

After successfully completing the course students will be able to-

1. Perform Link power budget and Rise Time Budget by proper selection of components and check its viability.
2. Perform Satellite Link design for Up Link and Down Link.

Subject Code & Name - Elective III 404191 PLC & Automation

Program Outcome

1. Student will get the ability to recognize industrial control problems suitable for PLC control
2. The learners will get an over view of technology of advanced topics such as SCADA, DCS Systems, Digital Controller, CNC Machines.

3. Student will gain the ability to select the essential elements and practices needed to develop and implement the Engineering Automation using PLC approach.

Course Outcomes

On successful completion of the course, students able to-

1. Understand PLC architecture
2. Develop PLC ladder programs for simple industrial applications
3. Design Automation systems for industrial applications
4. Implement the Engineering Automation using PLC approach.

Subject Code &Name - Elective III 404191 Audio Video Engineering

Program Outcome

1. After learning AVE course, students will get benefit to learn and understand the working of real life video system and the different elements of video system plus the encoding/decoding techniques.
2. The learners will be groomed up to understand different channel allocations, difference between various systems present in this world, their transmission and reception techniques.
3. Students will get insight on functioning of individual blocks, different standards of compression techniques and they will be acquainted with different types of analog, digital TV and HDTV systems.
4. The students will get overview of fundamentals of Audio systems and basics of Acoustics

Course Outcomes

On successful completion of the course, students able to-

1. Apply the fundamentals of Analog Television and Colour Television standards.
2. Explain the fundamentals of Digital Television, DTV standards and parameters.
3. Study and understand various HDTV standards and Digital TV broadcasting systems and acquainted with different types of analog, digital TV and HDTV systems.
4. Understand acoustic fundamentals and various acoustic systems.

Subject Code &Name - Elective IV 404194 Wireless Sensor Networks

Program Outcome

1. To learn basic concepts of Wireless sensor networks
2. To be familiar with architecture and protocols used in Wireless sensor networks
3. To provide knowledge of deployment and security issued of Wireless sensor networks

Course Outcomes

On completion of the course, student will be able to-

1. Explain various concepts and terminologies used in WSN
2. Describe importance and use of radio communication and link management in WSN
3. Explain various wireless standards and protocols associated with WSN
4. Recognize importance of localization and routing techniques used in WSN
5. Understand techniques of data aggregation and importance of security in WSN
6. Examine the issues involved in design and deployment of WSN

Subject Code &Name - Elective IV 404194 Renewable Energy Systems

Program Outcome

1. To study energy generation, different energy sources and their utilization and impact on environment
2. To gain knowledge of solar radiation and its applications
3. To understand the wind energy and its nature
4. To analyze the performance of solar collectors and wind turbines
5. To learn fuel cell and its efficiency

Course Outcomes

On successful completion of the course, students able to-

1. Interpret energy reserves of India and potential of different energy sources.
2. Measure the solar radiation parameters and performance of different solar collectors.
3. Calculate different parameters of wind turbine rotor.
4. Implicit the importance and applications of geothermal and ocean energy.
5. Demonstrate knowledge in field of fuel cell and potential for power generation.

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CAYMET's

Siddhant College of Engineering

Savitribai Phule Pune University, Pune

Final Year Information Technology (2015 Course)

COURSE OBJECTIVE & OUTCOMES

SEM I

Program Educational Objectives

1. Graduates of the program will possess strong fundamental concepts in mathematics, science, engineering and Technology to address technological challenges with emerging trends.
2. Possess knowledge and skills in the field of Computer Science & Engineering and Information Technology for analyzing, designing and implementing multifaceted engineering problems of any domain with innovative and efficient approaches.
3. Acquire an attitude and aptitude for research, entrepreneurship and higher studies in the field of Computer Science & Engineering and Information Technology.
4. Learn commitment to ethical practices, societal contributions through communities and life-long intellect.
5. Attain better communication, presentation, time management and team work skills leading to responsible & competent professionals and will be able to address challenges in the field of IT at global level.

Program Outcomes

1. An ability to apply knowledge of computing, mathematics including discrete mathematics as well as probability and statistics, science, engineering and technology.
2. An ability to define a problem and provide a systematic solution with the help of conducting experiments, as well as analyzing and interpreting the data.
3. An ability to design, implement, and evaluate a software or a software/hardware co-system, component, or process to meet desired needs within realistic constraints.
4. An ability to identify, formulate, and provide systematic solutions to complex engineering problems.
5. An ability to use the techniques, skills, and modern engineering technologies tools, standard processes necessary for practice as a IT professional.
6. An ability to apply mathematical foundations, algorithmic principles, and Information Technology theory in the modeling and design of computer-based systems with necessary constraints and assumptions.

7. An ability to analyze the local and global impact of computing on individuals, organizations and society.
8. An ability to understand professional, ethical, legal, security and social issues and responsibilities.
9. An ability to function effectively as an individual or as a team member to accomplish a desired goal(s).
10. An ability to engage in life-long learning and continuing professional development to cope up with fast changes in the technologies/tools with the help of electives, professional organizations and extra-curricular activities.
11. An ability to communicate effectively in engineering community at large by means of effective presentations, report writing, paper publications, demonstrations.
12. An ability to understand engineering, management, financial aspects, performance, optimizations and time complexity necessary for professional practice.
13. An ability to apply design and development principles in the construction of software systems of varying complexity.

Subject Code &Name - 414453 Information and Cyber Security

Course Objectives

1. Understand computer, network and information security.
2. To study operating system security and malwares.
3. To study security issues in internet protocols.
4. To study network defence tools.
5. To learn forensics and investigation techniques.

Course Outcomes

On completion of the course, learner will be able to

1. Use basic cryptographic techniques in application development.
2. Apply methods for authentication, access control, intrusion detection and prevention.
3. To apply the scientific method to digital forensics and perform forensic investigations.
4. To develop computer forensics awareness.
5. Ability to use computer forensics tools.

Subject Code &Name – 414454 Machine Learning and Applications

Course Objectives

1. Understanding Human learning aspects.
2. Understanding primitives and methods in learning process by computer.
3. Understanding nature of problems solved with Machine Learning.

Course Outcomes

On completion of the course, learner will be able to

1. Model the learning primitives.
2. Build the learning model.
3. Tackle real world problems in the domain of Data Mining and Big Data Analytics, Information Retrieval, Computer vision, Linguistics and Bioinformatics.

Subject Code &Name – 414455 Software Design and Modeling

Course Objectives

1. To teach the student the fundamental aspects of different object oriented methodologies and unified approach along with Unified Modeling Language (UML), in terms of “how to use” it for the purpose of specifying and developing software.
2. Explore and analyze use case modeling, domain/ class modeling.
3. To teach the student Interaction and behaviour modeling.
4. Aware students with design process in software development.
5. Orient students with the software design principles and patterns.
6. Enable students to learn the architectural design guidelines in various type of application development.

Course Outcomes

Describe the basics of thermodynamics with heat and work interactions.

1. Understand object oriented methodologies, basics of Unified Modeling Language (UML).
2. Understand analysis process, use case modeling, domain/class modeling
3. Understand interaction and behavior modeling.
4. Understand design process and business, access and view layer class design
5. Get started on study of GRASP principles and GoF design patterns.
6. Get started on study of architectural design principles and guidelines in the various type of application development.

Subject Code &Name - 414456E Elective-I - Business Analytics and Intelligence

Course Objectives

1. Apply conceptual knowledge on how business intelligence is used within organizations.
2. Evaluate organization’s abilities to create and mobilize corporate knowledge.
3. Select software tools for knowledge management systems in business organizations
4. Suggest design systems to provide business intelligence.

Course Outcomes

1. Comprehend the Information Systems and development approaches of Intelligent Systems.
2. Evaluate and rethink business processes using information systems.
3. Propose the Framework for business intelligence.
4. Get acquainted with the Theories, techniques, and considerations for capturing organizational intelligence.
5. Align business intelligence with business strategy.
6. Apply the techniques for implementing business intelligence systems.

Subject Code &Name -414457C Elective-II - Software Testing and Quality Assurance

Course Objectives

1. Learn to apply the testing strategies and methodologies in projects.
2. To understand test management strategies and tools for testing.
3. A keen awareness on the open problems in software testing and maintenance.
4. To explain quality assurance and various tools used in quality management.
5. To learn in detail about various quality assurance models.
6. To understand the audit and assessment procedures to achieve quality.

Course Outcomes

1. Test the software by applying testing techniques to deliver a product free from bugs.
2. Investigate the scenario and to select the proper testing technique.
3. Explore the test automation concepts and tools and estimation of cost, schedule based on standard metrics.
4. Understand how to detect, classify, prevent and remove defects.
5. Choose appropriate quality assurance models and develop quality.
6. Ability to conduct formal inspections, record and evaluate results of inspections.

Subject Code &Name -414458 Computer Laboratory VII

Course Objectives

1. To Understand the Security issues in networks and Applications software.
2. To understand the machine learning principles and analytics of learning algorithms.

Course Outcomes

On completion of the course, learner will be able to

1. The students will be able to implement and port controlled and secured access to software systems and networks.
2. The students will be able to build learning software in various domains.

Subject Code &Name – 414459 Computer Laboratory VIII

Course Objectives

1. To teach the student Unified Modeling Language (UML 2.0), in terms of “how to use” it for the purpose of specifying and developing software.
2. To teach the student how to identify different software artifacts at analysis and design phase.
3. To explore and analyze use case modeling.
4. To explore and analyze domain/ class modeling.
5. To teach the student Interaction and Behavior Modeling.
6. To Orient students with the software design principles and patterns.

Course Outcomes

On completion of the course, learner will be able to

1. Draw, discuss different UML 2.0 diagrams, their concepts, notation, advanced notation, forward and reverse engineering aspects.
2. Identify different software artifacts used to develop analysis and design model from requirements.
3. Develop use case model.
4. Develop, implement analysis model and design model.
5. Develop, implement Interaction and behavior Model.
6. Implement an appropriate design pattern to solve a design problem.

Subject Code &Name - 414460 Project Phase-I

Course Objectives

1. Student should be able implement their ideas/real time industrial problem/ current applications from their engineering domain.
2. Students should be able to develop plans with help of team members to achieve the project's goals.
3. Student should be able to break work down into tasks and determine appropriate procedures.
4. Student should be able to estimate and cost the human and physical resources required, and make plans to obtain the necessary resources.

5. Student should be able allocate roles with clear lines of responsibility and accountability and learn team work ethics.
6. Student should be able to apply communication skills to effectively promote ideas, goals or products.

Course Outcomes

On completion of the course, learner will be able to

1. To show preparedness to study independently in chosen domain of Information Technology and programming languages and apply their acquired knowledge to variety of real time problem scenarios.
2. To function effectively as a team to accomplish a desired goal.
3. An understanding of professional, ethical, legal, security and social issues and responsibilities related to Information Technology Project.

Subject Code &Name - 414461A Audit Course-V Emotional Intelligence

Course Objectives

1. To develop an awareness of EI models.
2. To recognize the benefits of EI.
3. To understand how you use emotion to facilitate thought and behaviour.
4. To know and utilize the difference between reaction and considered response.

Course Outcomes

On completion of the course, learner will be able to

1. Expand your knowledge of emotional patterns in yourself and others.
2. Discover how you can manage your emotions, and positively influence yourself and others.
3. Build more effective relationships with people at work and at home.
4. Positively influence and motivate colleagues, team members, and managers.
5. Increase your leadership effectiveness by creating an atmosphere that engages others.
6. Apply EI behaviours and supports high performance.

SEM II

Subject Code &Name – 414462 Distributed Computing System

Course Objectives

1. To understand the fundamentals and knowledge of the architectures of distributed systems.
2. To gain knowledge of working components and fault tolerance of distributed systems
3. To make students aware about security issues and protection mechanism for distributed environment.

Course Outcomes

On completion of the course, learner will be able to

1. Understand the principles and desired properties of distributed systems based on different application areas.
2. Understand and apply the basic theoretical concepts and algorithms of distributed systems in problem solving.
3. Recognize the inherent difficulties that arise due to distributed-ness of computing resources.
4. Identify the challenges in developing distributed applications

Subject Code &Name – 414463 Ubiquitous Computing

Course Objectives

1. To describe ubiquitous computing, its properties applications and architectural design.
2. To explain various smart devices and services used in ubiquitous computing.
3. To teach the role of sensors and actuators in designing real time applications using UbiComp.
4. To explore the concept of human computer interaction in the context of UbiComp.
5. To explain UbiComp privacy and challenges to privacy.
6. To describe UbiComp network with design issues and UbiComp management.

Course Outcomes

On completion of the course, learner will be able to

1. Demonstrate the knowledge of design of UbiComp and its applications.
2. Explain smart devices and services used UbiComp.
3. Describe the significance of actuators and controllers in real time application design.
4. Use the concept of HCI to understand the design of automation applications.
5. Classify UbiComp privacy and explain the challenges associated with UbiComp privacy.
6. Get the knowledge of ubiquitous and service oriented networks along with UbiComp management.

Subject Code & Name -414464B Elective III Information Storage and Retrieval

Course Objectives

1. To understand information retrieval process.
2. To understand concepts of clustering and how it is related to Information retrieval.
3. To deal Storage, Organization & Access to Information Items.
4. To evaluate the performance of IR system and understand user interfaces for searching.
5. To understand information sharing on semantic web.
6. To understand the various applications of Information Retrieval giving emphasis to multimedia and distributed IR, web Search.

Course Outcomes

On completion of the course, learner will be able to

Subject Code &Name -414465B Elective IV Parallel Computing

Course Objectives

1. Understand theories and practices in parallel computing.
2. Learning hardware concepts and various languages used in parallel computing.
3. Understand different challenges in parallel computing.

Course Outcomes

On completion of the course, learner will be able to

1. Understand fundamentals in parallel computing.
2. Understand and learn importance of technologies including different hardware structures used in parallel computing.
3. Understand challenges and opportunities in parallel computing.

Subject Code &Name -414466 Computer Laboratory-Ix

Course Objectives

1. The course aims to provide an understanding of the principles on which the distributed systems are based; their architecture, algorithms and how they meet the demands of Distributed applications.
2. The course covers the building blocks for a study related to the design and the implementation of distributed systems and applications.

Course Outcomes

On completion of the course, learner will be able to

1. Demonstrate knowledge of the core concepts and techniques in distributed systems.
2. Learn how to apply principles of state-of-the-Art Distributed systems in practical application.
3. Design, build and test application programs on distributed systems.

Subject Code &Name -414467 Computer Laboratory-X

Course Objectives

1. To design and implement user interfaces for performing database operations.
2. To design applications for accessing smart devices and data generated through sensors and services.
3. To implement authentication protocols for providing security.

Course Outcomes

On completion of the course, learner will be able to

1. Set up the Android environment and explain the Evolution of cellular networks.
2. Develop the User Interfaces using pre-built Android UI components.
3. Create applications for performing CRUD SQLite database operations using Android.
4. Create the smart android applications using the data captured through sensors.
5. Implement the authentication protocols between two mobile devices for providing. Security.
6. Analyze the data collected through android sensors using any machine learning algorithm.

Subject Code &Name -414468 Project Work

Course Objectives

1. The object of Project Work II & Dissertation is to enable the student to extend further the investigative study taken up under Project stage 1, either fully theoretical/practical or involving both theoretical and practical work, under the guidance of a Supervisor from the Department alone or jointly with a Supervisor drawn from R&D laboratory/Industry.
2. To expose students to product development cycle using industrial experience, use of state of art technologies.
3. To encourage and expose students for participation in National/International paper presentation activities and funding agency for sponsored projects.
4. Exposure to Learning and knowledge access techniques using Conferences, Journal papers and anticipation in research activities.
5. Evaluate the various validation and verification methods.

6. Analyzing professional issues, including ethical, legal and security issues, related to computing projects.

Course Outcomes

On completion of the course, learner will be able to

1. Learn teamwork.
2. Be well aware about Implementation phase.
3. Get exposure of various types of testing methods and tools.
4. Understand the importance of documentation.

Subject Code &Name – 414461A Audit Course- IoT Applications in Engineering Field

Course Objectives

1. To get the detailed insight of Internet of Things.
2. To learn the IoT terms in Engineering.
3. To understand how IoT concepts can be implement.
4. To know the protocols, Sensors and other elements for IoT implementation

Course Outcomes

1. Expand your knowledge of Internet of Things.
2. Discover how you can use IoT in your Engineering applications.
3. Build more effective hands on with IoT elements.
4. Expand the practical knowledge of using IoT components like sensors, processors.
5. Expand the understanding of using different protocols.

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CAYMET's
Siddhant College of Engineering
Savitribai Phule Pune University, Pune
Fourth Year Mechanical Engineering (2015 Course)
COURSE OBJECTIVE & OUTCOMES

SEM I

Subject Code & Name - 402041 Hydraulics and Pneumatics

Course Objectives

1. To study governing laws used in fluid power systems
2. To study fluid power applications
3. To study working principles of various components
4. To study selection of different components
5. To study how to design fluid power systems
6. To study low cost automation

Course Outcomes

1. Understand working principle of components used in hydraulic & pneumatic systems
2. Identify various applications of hydraulic & pneumatic systems
3. Selection of appropriate components required for hydraulic and pneumatic systems
4. Analyse hydraulic and pneumatic systems for industrial/mobile applications
5. Design a system according to the requirements
6. Develop and apply knowledge to various applications

Subject Code & Name – 402042 CAD CAM and Automation

Course Objectives

1. To apply homogeneous transformation matrix for geometrical transformations of 2D/3D CAD entities
2. To model mathematically analytical and synthetic curves, surfaces
3. To predict performance of simple mechanical components viz. beam, shafts, plates, trusses using FEA (Mathematical and Software treatment)
4. To generate CNC program for appropriate manufacturing techniques viz. turning and milling
5. To select and apply suitable Rapid Prototyping techniques for engineering applications
6. To study role and components of different Automation strategies.

Course Outcomes

1. Apply homogeneous transformation matrix for geometrical transformations of 2D CAD entities for basic geometric transformations.
2. Use analytical and synthetic curves and surfaces in part modeling.
3. Do real times analysis of simple mechanical elements like beams, trusses, etc. and comment on safety of engineering components using analysis software.
4. Generate CNC program for Turning / Milling and generate tool path using CAM software.
5. Demonstrate understanding of various rapid manufacturing techniques and develop competency in designing and developing products using rapid manufacturing technology.
6. Understand the robot systems and their applications in manufacturing industries.

Subject Code & Name – 402043 Dynamics of Machinery

Course Objectives

1. To conversant with balancing problems of machines.
2. To understand fundamentals of free and forced vibrations.
3. To develop competency in understanding of vibration and noise in Industry.
4. To develop analytical competency in solving vibration problems.
5. To understand the various techniques of measurement and control of vibration and noise.

Course Outcomes

1. Apply balancing technique for static and dynamic balancing of multi cylinder inline and radial engines.
2. Estimate natural frequency for single DOF undamped & damped free vibratory systems.
3. Determine response to forced vibrations due to harmonic excitation, base excitation and excitation due to unbalance forces.
4. Estimate natural frequencies, mode shapes for 2 DOF undamped free longitudinal and torsional vibratory systems.
5. Describe vibration measuring instruments for industrial / real life applications along with suitable method for vibration control.
6. Explain noise, its measurement & noise reduction techniques for industry and day to day life problems.

Subject Code & Name – 402044 A Elective – I Finite Element Analysis

Course Objectives

1. To understand the philosophy and general procedure of Finite Element Method as applied to solid mechanics and thermal analysis problems.
2. To familiarize students with the displacement-based finite element method for displacement and stress analysis and to introduce related analytical and computer tools.
3. It provides a bridge between hand calculations based on mechanics of materials and machine design and numerical solutions for more complex geometries and loading states.
4. To study approximate nature of the finite element method and convergence of results are examined.
5. It provides some experience with a commercial FEM code and some practical modeling exercises.

Course Outcomes

1. Understand the different techniques used to solve mechanical engineering problems.
2. Derive and use 1-D and 2-D element stiffness matrices and load vectors from various methods to solve for displacements and stresses.
3. Apply mechanics of materials and machine design topics to provide preliminary results used for testing the reasonableness of finite element results.
4. Explain the inner workings of a finite element code for linear stress, displacement, temperature and modal analysis.
5. Use commercial finite element analysis software to solve complex problems in solid mechanics and heat transfer.
6. 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.

Subject Code & Name – 402044 B Elective – I Computational Fluid Dynamics

Course Objectives

1. Students should be able to model fluid / heat transfer problems and apply fundamental conservation principles.
2. Students should be able to discretize the governing equations by Finite Difference Method and Finite volume Method.
3. Students should be able to develop programming skills by in-house code development for conduction, convection and fluid dynamics problems.
4. Students should be able to solve basic convection and diffusion equations and understand the role

in fluid flow and heat transfer.

5. To prepare the students for research leading to higher studies.
6. To prepare the students for career in CAE industry using software tools

Course Outcomes

1. Analyze and model fluid flow and heat transfer problems.
2. Generate high quality grids and interpret the correctness of numerical results with physics.
3. Conceptualize the programming skills.
4. Use a CFD tool effectively for practical problems and research.

Subject Code & Name – 402044 C Heating, Ventilation, Air Conditioning and Refrigeration Engineering

Course Objectives

1. To understand the recent vapour compression cycle
2. To provide the knowledge of analyze thermal design of refrigeration system components
3. To understand practical aspects of vapour compression system
4. To provide the knowledge of basic concepts of ventilation, infiltration and space distribution techniques
5. To inculcate techniques of estimating building envelop load.
6. To understand the working non-conventional air-conditioning systems.

Course Outcomes

1. Determine the performance parameters of trans-critical & ejector refrigeration systems
2. Estimate thermal performance of compressor, evaporator, condenser and cooling tower.
3. Describe refrigerant piping design, capacity & safety controls and balancing of vapor compressor system.
4. Explain importance of indoor and outdoor design conditions, IAQ, ventilation and air distribution system.
5. Estimate heat transmission through building walls using CLTD and decrement factor & time lag methods with energy-efficient and cost-effective measures for building envelope.
6. Explain working of types of desiccant, evaporative, thermal storage, radiant cooling, clean
7. room and heat pump air-conditioning systems.

Subject Code & Name – 402045 A Elective – II Automobile Engineering

Course Objectives

1. To make the student conversant with fundamentals of automobile systems.

2. To develop competencies in performance analysis of vehicles.
3. To make the student conversant with automobile safety, electrical system and vehicle maintenance.
4. To understand the emerging trends of electric vehicles hybrid electric vehicles and solar vehicles.

Course Outcomes

1. To compare and select the proper automotive system for the vehicle.
2. To analyse the performance of the vehicle.
3. To diagnose the faults of automobile vehicles.
4. To apply the knowledge of EVs, HEVs and solar vehicles

Subject Code & Name – 402045 B Elective – II Operation Research

Course Objectives

1. To familiarize the students with the use of practice oriented mathematical applications for optimization functions in an organization.
2. To familiarize the students with various tools of optimization, probability, statistics and simulation, as applicable in particular scenarios in industry for better management of various resources.

Course Outcomes

1. Apply LPP and Decision Theory to solve the problems
2. Apply the concept of transportation models to optimize available resources.
3. Decide optimal strategies in conflicting situations.
4. Implement the project management techniques.
5. Minimize the process time
6. Optimize multi stage decision making problems

Subject Code & Name – 402045 C Elective – II Energy Audit and Management

Course Objectives

Following concepts to be taught to the students,

1. Importance of Energy Management.
2. To Carry out Energy Audit.
3. Methods to reduce consumption of energy and save cost.
4. To improve energy efficiency of overall system.
5. Significance of Waste heat recovery and Cogeneration.

Course Outcomes

1. Compare energy scenario of India and World.

2. Carry out Energy Audit of the Residence / Institute/Organization.
3. Evaluate the project using financial techniques
4. Identify and evaluate energy conservation opportunities in Thermal Utilities.
5. Identify and evaluate energy conservation opportunities in Electrical Utilities.
6. Identify the feasibility of Cogeneration and WHRUse a CFD tool effectively for practical problems and research.

Subject Code & Name – 402046 Project – I

Course Objectives

1. To have ideology of the industrial project.
2. Hands on working with tools, tackles and machines
3. To carry out literature survey
4. To do brain storming for mechanical engineering system

Course Outcomes

1. Find out the gap between existing mechanical systems and develop new creative new mechanical system.
2. Learn about the literature review
3. Get the experience to handle various tools, tackles and machines

SEM II

Subject Code & Name – 402047 Energy Engineering

Course Objectives

1. To study the power generation scenario, the components of thermal power plant, improved Rankin cycle, Cogeneration cycle
2. To understand details of steam condensing plant, analysis of condenser, the an environmental impacts of thermal power plant, method to reduce various pollution from thermal power plant
3. To study layout, component details of hydroelectric power plant, hydrology and elements , types of nuclear power plant
4. To understand components; layout of diesel power plant , components; different cycles ; methods to improve thermal efficiency of gas power plant
5. To study the working principle , construction of power generation from non-conventional sources of energy
6. To learn the different instrumentation in power plant and basic so economics of power generation.

Course Outcomes

1. Describe the power generation scenario, the layout components of thermal power plant and analyze the improved Rankin cycle, Cogeneration cycle
2. Analyze the steam condensers, recognize the an environmental impacts of thermal power plant and method to control the same
3. Recognize the layout, component details of hydroelectric power plant and nuclear power plant
4. Realize the details of diesel power plant, gas power plant and analyze gas turbine power cycle
5. Emphasize the fundamentals of non-conventional power plants
6. Describe the different power plant electrical instruments and basic principles of economics of power generation.

Subject Code & Name – 402048 Mechanical System Design

Course Objectives

1. To develop competency for system visualization and design.
2. To enable student to design cylinders and pressure vessels and to use IS code.
3. To enable student select materials and to design internal engine components.
4. To introduce student to optimum design and use optimization methods to design mechanical components.

5. To enable student to design machine tool gearbox.
6. To enable student to design material handling systems.
7. Ability to apply the statistical considerations in design and analyze the defects and failure modes in components.

Course Outcomes

1. Understand the difference between component level design and system level design.
2. Design various mechanical systems like pressure vessels, machine tool gear boxes, material handling systems, etc. for the specifications stated/formulated.
3. Learn optimum design principles and apply it to mechanical components.
4. Handle system level projects from concept to product.

Subject Code & Name – 402049 A Elective – III Tribology

Course Objectives

1. To provide the knowledge and importance of Tribology in Design, friction, wear and lubrication aspects of machine components.
2. To select proper grade lubricant for specific application.
3. To understand the principles of lubrication, lubrication regimes, theories of hydrodynamic and the advanced lubrication techniques.
4. To introduce the concept of surface engineering and its importance in tribology.
5. To understand the behaviour of Tribological components.

Course Outcomes

1. The course will enable the students to know the importance of Tribology in Industry.
2. The course will enable the students to know the basic concepts of Friction, Wear, Lubrications and their measurements.
3. This course will help students to know the performance of different types of bearings and analytical analysis thereof.
4. This course will help students to apply the principles of surface engineering for different applications of tribology.

Subject Code & Name – 402049 B Elective – III Industrial Engineering

Course Objectives

1. To introduce the concepts, principles and framework of contents of Industrial Engineering.
2. To acquaint the students with various productivity enhancement techniques.

3. To acquaint the students with different aspects of Production Planning and Control and Facility Design.
4. To introduce the concepts of various cost accounting and financial management practices as applied in industries.
5. To acquaint the students with different aspects of Human Resource activities and Industrial Safety rules.
6. To acquaint students with different aspect of simulation modeling for various industrial engineering applications.

Course Outcomes

1. Apply the Industrial Engineering concept
2. Understand, analyze and implement different concepts involved in method study.
3. Design and Develop different aspects of work system and facilities.
4. Understand and Apply Industrial safety standards, financial management practices.
5. Undertake project work based on modelling & simulation area.

Subject Code & Name – 402049 C Elective – III Robotics

Course Objectives

1. To get acquainted with basic components of robotic systems.
2. To study various gripper mechanisms and sensors and understand role of suitable control system.
3. To understand statistics & kinematics of robots
4. To develop competency in obtaining desired motion of the robot.
5. To study various programming methods in robotics.
6. To understand need of modern techniques in robotics

Course Outcomes

1. Identify different type of robot configuration with relevant terminology.
2. Select suitable sensors, actuators and drives for robotic systems.
3. Understand kinematics in robotic systems.
4. Design robot with desired motion with suitable trajectory planning.
5. Select appropriate robot programming for given application.
6. Understand need of IoT, machine learning, simulation in robotics.

Subject Code & Name – 402050 A Elective – IV Advanced Manufacturing Processes

Course Objectives

1. To analyze and identify applications of special forming processes
2. To analyze and identify applications of advanced joining processes
3. To understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
4. To understand various applications and methods of micro and nano fabrication techniques
5. To understand advanced Additive Manufacturing (AM) technology for innovations in product development
6. To understand various material characterization techniques.

Course Outcomes

1. Classify and analyze special forming processes
2. Analyze and identify applicability of advanced joining processes
3. Understand and analyze the basic mechanisms of hybrid non-conventional machining techniques
4. Select appropriate micro and nano fabrication techniques for engineering applications
5. Understand and apply various additive manufacturing technology for product development
6. Understand material characterization techniques to analyze effects of chemical composition, composition variation, crystal structure, etc.

Subject Code & Name – 402050 C Elective – IV Product Design and Development

Course Objectives

To explain student's significance of

1. Product design and Product development process
2. Customer needs, satisfaction and commercialization of product
3. Forward & Reverse Engineering and its role in designing a product
4. Design Aspects (DFA, DFMEA, Design for Reliability and Safety)
5. Product Life Cycle Management and Product Data Management

Course Outcomes

On completion of the course, students will be able to

1. Understand essential factors for product design
2. Design product as per customer needs and satisfaction
3. Understand Processes and concepts during product development
4. Understand methods and processes of Forward and Reverse engineering
5. Carry various design processes as DFA, DFMEA, design for safety

6. Understand the product life cycle and product data management
