

Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Ra shtrasant Tukadoji Maharaj Nagpur University)

Hingna Road, Wanadongri, Nagpur - 441 110

NAAC Accredited with 'A++' Grade

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Summary of 2.6.1

CO-PO and its Communication to Stakeholders

1) **The Institution communicates the Cos and Pos to the teachers and students through –**

- College website : <http://www.ycce.edu>
- Department Moodle
- Department Notice Boards and Displays
- Program Specific Laboratories notice boards
- Display in HoD office
- Course Hand-Outs/Teaching Plan
- Course Files
- Laboratories Manuals and Notice Borads
- Department Magazine/News letters
- Display at the Prominent Locations in the Campus

2) **Co-PO & PSO of Programs offered by the Departments**



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Civil Engineering



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Department of Civil Engineering

Session 2021-22

SEM	Course Name	Code	CO	Course Objectives	Course Outcomes
3 Sem	Engineering Mathematics-III	GE2201	GE2201.1	1. Finite Differences for Numerical Differentiation and Integration.	1. Estimate the Calculus of Numerical Function and Solve difference equations.
			GE2201.2	2. Different Transformation for solving difference and differential equation.	2. Determine the transforms and inverse transforms of various functions and Apply it to solve Mathematical equations.
			GE2201.3	3. Partial differential equation with 1 st and higher order.	3. Discuss the periodicity of functions and express it in terms of Fourier series.
			GE2201.4		4. Solve partial differential equations.
3 Sem	Strength of Materials	CV2201	CO2201.1	1. Various mechanical properties of materials.	1. Explain the basic concept and mechanical properties of materials.
			CO2201.2	2. Simple and compound stresses and strains	2. Construct graphically the variation of shear force, bending moment and stresses.
			CO2201.3	3. Bending of beams and torsion of shaft, deflection in beams	3. Analyze the behavior of various structural components under different types of loading.
			CO2201.4	4. Shear force and bending moment and their graphical representation.	4. Calculate the slope, deflection and torsion of shaft.
3 Sem	LAB : Strength of Materials	CV2202	CO2202.1	1. Various mechanical properties of materials.	1. Explain the basic concept and mechanical properties of materials.
			CO2202.2	2. Simple and compound stresses and strains	2. Calculate the Shear stress, stiffness, and impact test.
			CO2202.3	3. Bending of beams and torsion of shaft, deflection in beams	3. Analyze the behavior of various structural components under different types of loading.
			CO2202.4	4. Shear stress, stiffness, and impact test.	4. Evaluate the properties of materials by conducting experiment.
3 Sem	Geotechnical Engineering	CV2203	CO2203.1	1. Index properties of soil and its classification.	1. Determine index properties of soil and its classification
			CO2203.2	2. Engineering properties of soil.	2. Compute Engineering properties of soil.
			CO2203.3	3. Compaction of soil.	3. Predict Compaction of soil.
			CO2203.4	4. Vertical stresses and shear strength of soil.	4. Calculate Vertical stresses and shear strength of soil
3 Sem	LAB: Geotechnical Engineering	CV2204	CO2204.1	1. Index properties of soil and its classification.	1. Determine index properties of soil and its classification
			CO2204.2	2. Engineering properties of soil.	2. Compute Engineering properties of soil.
			CO2204.3	3. Compaction of soil.	3. Predict Compaction of soil.
			CO2204.4	4. Vertical stresses and shear strength of soil.	4. Calculate Vertical stresses and shear strength of soil
3 Sem	Fluid Mechanics	CV2205	CO2205.1	1. The fundamentals of fluid properties, Fluid static, pressure measuring devices.	1. Calculate various fluid properties, Fluid pressure, forces on various surface
			CO2205.2	2. Motion of fluid without reference of force	2. Determine various flow patterns of fluid produced without reference of force.
			CO2205.3	3. Motion of fluid producing with reference of force	3. Examine the fundamental principles of fluid mechanics and related applications to fluid flow.
			CO2205.4	4. Flow measuring devices in pipe, channel and tank	4. Compute the flow in pipe, channel and tank by using various devices.
3 Sem	LAB: Fluid Mechanics	CV2206	CO2206.1	1. The fundamentals of fluid properties, Fluid static, pressure measuring devices.	1. Determine floating conditions of submerged body.
			CO2206.2	2. Motion of fluid without reference of force	2. Explain various flow patterns of fluid produced without reference of force.
			CO2206.3	3. Motion of fluid producing with reference of force	3. Examine the fundamental principles of fluid mechanics and related applications to fluid flow.
			CO2206.4	4. Flow measuring devices in pipe, channel and tank	4. Compute the flow in pipe, channel and tank by using various devices.
3 Sem	Water Supply Engineering	CV2207	CO2207.1	1. Water demand, components of public water supply scheme and population forecasting.	1. Predict population forecasting including design of water conveyance system and raising main.
			CO2207.2	2. Conveyance of water, water quality and objectives of water treatment.	2. Explain different characteristics of water and water treatment methods.
			CO2207.3	3. Working of various water treatment units and distribution system.	3. Classify different methods and patterns of distribution of water.
			CO2207.4	4. Solid waste management.	4. Illustrate various methods of solid waste management.
3 Sem	LAB: Water Supply Engineering	CV2208	CO2208.1	1. Water quality criteria and permissible standards.	1. Examine water quality standards.
			CO2208.2	2. Physical and chemical characteristics of water.	2. Experiment on various characteristics of water
			CO2208.3	3. Biological characteristics of water	3. Compute different characteristics of water.
			CO2208.4	4. Analysis of various parameters related to water quality.	4. Relate water quality with permissible standards.

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4 Sem	Advanced Mathematical Techniques	GE2204	CO2204.1	1. Numerical methods for solving transcendental equations, simultaneous equations and differential equations.	1. Apply numerical techniques to obtain approximate solutions of mathematical equations.
			CO2204.2	2. Random variable and probability distribution for determining statistical parameters.	2. Formulate LPP in Mathematical form and determine the optimal solution of linear programming problems.
			CO2204.3	3. Basic concept of fuzzy sets, Relations and fuzzy logic.	3. Determine the Statistical parameters for random variables.
			CO2204.4	4. Mathematical formulation and solving methods of linear programming problems.	4. Explain the basic concept of fuzzy sets, Relations and fuzzy logic.
4 Sem	Concrete Technology	CV2251	CO2251.1	1. Properties of Cement, Fine aggregate and Coarse Aggregate.	1. Explain the properties of the constituent materials of concrete.
			CO2251.2	2. Properties of Fresh Concrete, Harden Concrete and NDT.	2. Examine the properties of fresh and hardened concrete and tests to determine these properties.
			CO2251.3	3. Design of Concrete Mix for various grades.	3. Analyse the concrete mixes design and apply statistical quality control techniques
			CO2251.4	4. Role of Admixture and Durability of Concrete	4. Explain admixtures, their role in concrete properties and various durability aspects in concrete.
4 Sem	Lab: Concrete Technology	CV2252	CO2252.1	1. Properties of Cement, Fine aggregate and Coarse Aggregate.	1. Explain the properties of the constituent materials of concrete.
			CO2252.2	2. Properties of Fresh Concrete, Harden Concrete and NDT.	2. Examine the properties of fresh and hardened concrete and tests to determine these properties.
			CO2252.3	3. Design of Concrete Mix for various grades.	3. Analyse the concrete mixes design and apply statistical quality control techniques
			CO2252.4	4. Role of Admixture and Durability of Concrete.	4. Explain admixtures, their role in concrete properties and various durability aspects in concrete.
4 Sem	Surveying	CV2253	CO2253.1	1. Explain the properties of the constituent materials of concrete.	1. Discuss the basic concepts of surveying and use of conventional surveying equipment.
			CO2253.2	2. Examine the properties of fresh and hardened concrete and tests to determine these properties.	2. Calculate the horizontal, vertical angle and distances by using dumpy level and theodolite.
			CO2253.3	3. Analyse the concrete mixes design and apply statistical quality control techniques	3. Explain the methods of plane table surveying and compute the volume of earthwork.
			CO2253.4	4. Explain admixtures, their role in concrete properties and various durability aspects in concrete.	4. Compute the distance and elevation by using tachometric survey.
4 Sem	Lab : Surveying	CV2254	CO2254.1	1. Compass, ranging rod, chain and its use in field	1. Discuss the basic concepts of surveying and use of conventional surveying equipment.
			CO2254.2	2. Dumpy level, auto level, levelling staff and its various use in the field	2. Calculate the horizontal, vertical angle and distances by using dumpy level and theodolite.
			CO2254.3	3. Theodolite, Consecutive and independent co-ordinates system of surveying	3. Explain the methods of plane table surveying and compute the volume of earthwork.
			CO2254.4	4. Plane table, tachometer and its use in the field.	4. Compute the distance and elevation by using tachometric survey.
4 Sem	Structural Analysis	CV2255	CO2255.1	1. Analysis of continuous beams using three moment theorem, moment distribution method, slope deflection method	1. Explain basic concepts of structural analysis, strain gauges and strain measurements.
			CO2255.2	2. Analysis of plane frames using moment distribution method, slope deflection method, Strain Energy Method	2. Apply various theoretical concepts of different methods of structural analysis.
			CO2255.3	3. Influence line diagrams for beam and about buckling of columns and analysis of arches	3. Analyze different types of structures like beam, column, parabolic arches and trusses theoretically and experimentally.
4 Sem	Lab: Structural Analysis	CV2256	CO2256.1	1. Basic concept of strain measurements,	1. Explain basic concepts of structural analysis, strain gauges and strain measurements.
			CO2256.2	2. Various methods for finding deflection in truss analytically and graphically.	2. Apply various theoretical concepts of different methods of structural analysis.
			CO2256.3	3. Analysis of the arches and various properties of beam like flexural rigidity, slope, deflection, bending moment etc.	3. Analyze different types of structures like beam, column, parabolic arches and trusses theoretically and experimentally.
			CO2256.4	4. Behaviour of column curved member and portal frame.	
4 Sem	Transportation Engineering	CV2257	CO2257.1	1. Concepts of highway and railway engineering.	1. Explain the concepts of highway and railway engineering.
			CO2257.2	2. Geometric elements and construction and maintenance of road.	2. Compute geometric elements and explain construction and maintenance procedures for road pavements.
			CO2257.3	3. Properties of highway materials.	3. Describe and compute properties of highway materials.
			CO2257.4	4. Bridge engineering, estimate flood discharge and forces acting on bridges.	4. Investigate flood discharge and forces acting on bridges.
4 Sem	Lab : Transportation Engineering	CV2258	CO2258.1	1. Basic concepts of highway and railway engineering.	1. Explain the basic concepts of highway and railway engineering.
			CO2258.2	2. Geometric elements and explain construction and maintenance procedures for road pavements.	2. Compute geometric elements and explain construction and maintenance procedures for road pavements.
			CO2258.3	3. Basic properties of highway materials.	3. Describe and compute basic properties of highway materials.
			CO2258.4	4. Basics of bridge engineering and estimate flood discharge and forces acting on bridges.	

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5 Sem	Fundamental of management	GE2311	CO2311.1	The Fundamentals and Legal Provision of Management	Interpret Legal provision and various Principles of Management
			CO2311.2	Human Resource and Financial practice of Organization	Classify the working of Human Resource and Financial Management in the organization
			CO2311.3	Project Management	Illustrate the Procedure and methods of Project Management
			CO2311.4	Marketing activities of Management	Analyse techniques of marketing of goods and services
5 Sem	Reinforced Concrete Structures	CV2301	CO2301.1	The structural properties of steel and concrete and their applications in structural planning.	Explain the structural properties of steel and concrete and their applications in structural planning
			CO2301.2	The Design philosophies of RCC structures.	Apply the knowledge of various methods of structural design
			CO2301.3	The Design of RC structural elements by limit state method.	Analysis, design and carry out the detailing of RC structural elements
			CO2301.4	The concepts of prestressed concrete.	Illustrate the concept and application of prestressed concrete
5 Sem	Advanced Structural Analysis	CV2302	CO2302.1	Basic principles of the matrix method of structural analysis	Explain the matrix methods of structural analysis and its
			CO2302.2	Analysis of non-prismatic structures (beams and frames) using column analogy method	Relate the column analogy method with other analysis method and apply its application to beam structure.
			CO2302.3	Analysis of sway frames using moment distribution method.	Analyze the frame structure by moment distribution method.
			CO2302.4	Analysis of multistoried frame structures using approximate methods	Apply the approximate method for analysis of multistoried frame structures
5 Sem	LAB : Analysis and Design Studio	CV2303	CO2303.1	Modelling of beam, plane truss and frame in the software package, applying the required properties, boundary conditions and forces in the developed models.	Develop and execute the Beams, Plane truss, Frames in the software package without any error.
			CO2303.2	Analysis of beams, Plane truss, Frames using standard software package without any error.	Analyze the Beams, Plane truss, Frames in the software package without any error.
			CO2303.3	Analysis and design of the RCC structural elements using standard software package without any error.	Analyze and design the RCC structural elements in the software package without any error
			CO2303.4	The comparison of result between manual analysis and design and software analysis and design	Compare the result between manual analysis and output result of the software.
5 Sem	PE-I : Advance Surveying	CV2311	CO2311.1	Theodolite, ranging rod, chain, tape and its use in field.	Distinguish the horizontal and vertical curve.
			CO2311.2	Basic principle and application of geodetic surveying.	Classify the triangulation system
			CO2311.3	Basic principle and application of electronic surveying.	Illustrate the basic concepts of electronic surveying
			CO2311.4	Photo scale, flight planning for aerial surveying.	Explain the basic concepts of photographic surveying

5 Sem	PE-I : LAB - Advance Surveying	CV2312	CO2312.1	Theodolite, ranging rod , chain, tape and its use in field	Distinguish the horizontal and vertical curve.
			CO2312.2	Basic principle and application of geodetic surveying.	Classify the triangulation system
			CO2312.3	Basic principle and application of electronic surveying.	Illustrate the basic concepts of electronic surveying
			CO2312.4	Photo scale, flight planning for aerial surveying.	Explain the basic concepts of photographic surveying
5 Sem	PE-I : Computer Application In Civil Engineering	CV2313	CO2313.1	Basic concepts of C Programming language	Explain the basic concepts of C Programming language
			CO2313.2	Computer programs for the solution of Civil Engineering problems.	Apply the knowledge of C program to write simple programs.
			CO2313.3	Programs for the solution of numerical methods and civil engineering	Develop computer programs for the solution of numerical methods and civil engineering problems
5 Sem	PE-I : LAB - Computer Application In Civil Engineering	CV2314	CO2314.1	Basic concepts of C Programming language	Explain the basic concepts of C Programming language
			CO2314.2	Computer programs for the solution of Civil Engineering problems.	Apply the knowledge of C program to write simple programs.
			CO2314.3	Programs for the solution of numerical methods and civil engineering	Develop computer programs for the solution of numerical methods and civil engineering problems
5 Sem	PE-I : Building Construction Materials	CV2315	CO2315.1	Investigate the soil condition , deciding and design of suitable foundation for different structure	Explain different aspects of building construction and their importance
			CO2315.2	Understand the selection of material , design and supervision of suitable type of floor and roof	Draw and explain about various building elements and material and their uses in building construction
			CO2315.3	Gain knowledge about doors, windows, plastering, painting, dam proofing, scaffolding, shoring, underpinning and to take suitable engineering measures.	Illustrate various provision in IS codes related to building construction
				Administer construction work of a residential building	
5 Sem	PE-I : LAB - Building Construction Materials	CV2316	CO2316.1	Importance of IS code in building construction.	Explain different aspects of building construction and their importance
			CO2316.2	Develop and apply basic skills in exterior finish work.	Draw and explain about various building elements and material and their uses in building construction
			CO2316.3	The supervision of different types of masonry work.	Illustrate various provision in IS codes related to building construction
5 Sem	PE-I :Matrix Analysis of Structures	CV2317	CO2317.1	Basic concepts of direct stiffness method.	Apply the stiffness method for structural analysis.
			CO2317.2	Analysis of continuous beam, plane truss, plane frame neglecting axial deformation, plane frame considering axial deformation by stiffness method.	Analyze continuous beams, plane truss, plane frame neglecting axial deformation, plane frame considering axial deformation.
			CO2317.3	Analysis of various structures subjected to special effects.	Evaluate continuous beams, plane truss with special effects.
			CO2317.4	Modern techniques and storage techniques.	Explain various storage techniques used in computer programming for structural analysis.
			CO2318.1	Developing models of various structures in the software package, and apply the required properties, boundary conditions and forces in the developed models.	Develop the beam model, plane truss model, and plane frame model with and without axial deformation in the software package without any error.

5 Sem	PE-I : LAB - Matrix Analysis of Structures	CV2318	CO2318.2	Analysis of various structural elements by stiffness method of structural analysis.	Analyze the beam model, plane truss model, and plane frame model with and without axial deformation in the software package without any error.
			CO2318.3	Execution of computer programme using standard software package without any error.	Compare the result between manual analysis and output result of the software package, and the application of software package and limitation of manual analysis.
				Comparison of results between manual analysis and software package analysis.	
5 Sem	PE-I : Advanced Concrete Technology	CV2319	CO2319.1	Properties of Cement, Fine aggregate and Coarse Aggregate.	Explain the properties of the constituent materials of concrete.
			CO2319.2	Properties of Fresh Concrete, Harden Concrete and NDT.	Examine the properties of fresh and hardened concrete and tests to determine these properties.
			CO2319.3	Design of Concrete Mix for various grades.	Analyse the concrete mixes design and apply statistical quality control techniques.
			CO2319.4	Role of Admixture and Durability of Concrete.	Explain admixtures, their role in concrete properties and various durability aspects in concrete.
5 Sem	PE-I : LAB - Advanced Concrete Technology	CV2320	CO2320.1	Properties of Cement, Fine aggregate and Coarse Aggregate.	Explain the properties of the constituent materials of concrete.
			CO2320.2	Properties of Fresh Concrete, Harden Concrete and NDT.	Examine the properties of fresh and hardened concrete and tests to determine these properties.
			CO2320.3	Design of Concrete Mix for various grades.	Analyse the concrete mixes design and apply statistical quality control techniques.
			CO2320.4	Role of Admixture and Durability of Concrete.	Explain admixtures, their role in concrete properties and various durability aspects in concrete.
5 Sem	PE-I : Water Treatment	CV2321	CO2321.1	Various treatment processes and their fundamentals.	Understand working of water treatment units and their significance in water treatment.
			CO2321.2	Various water treatment units and their working.	Understand fundamentals of unit processes and analyse data related to the processes.
			CO2321.3	Design of water treatment units	Design different water treatment units.
5 Sem	PE-I : LAB - Water Treatment	CV2322	CO2322.1	To study the water quality criteria & permissible standards	An ability to carry out different experiments to determine various characteristic of water
			CO2322.2	To study the characteristics of water and experimental procedure	To design and understand various water treatments units
				To study the analysis of various parameters related to water quality	
5 Sem	PE-I : Environmental Management	CV2323	CO2323.1	Various analysis tools of environmental management	Explain the importance of environmental management tools.
			CO2323.2	Role of impact assessment studies in environmental management	Illustrate the procedures impact assessment studies in environmental management
			CO2323.3	Importance of environmental legislations and audit	Explain environmental legislations and policies for environmental resources.

			CO2323.4	Natural resources, challenges & prospects for sustainable development.	Explain the need of resource management and its challenges for sustainable development
5 Sem	PE-I : LAB - Environmental Management	CV2324	CO2324.1	Various analysis tools of environmental management	Explain the importance of environmental management tools.
			CO2324.2	Role of impact assessment studies in environmental management	Illustrate the procedures impact assessment studies in environmental management
			CO2324.3	Importance of environmental legislations and audit	Explain environmental legislations and policies for environmental resources.
			CO2324.4	Natural resources, challenges & prospects for sustainable development	Explain the need of resource management and its challenges for sustainable development
			CO2325.1	Properties of the expansive and soft-soil	Examine properties of the expansive and soft soil
5 Sem	PE-I : Soil Characterization & Identification	CV2325	CO2325.2	Characteristics of Liquefiable and filled up Soils	Explain characteristics of Liquefiable and filled up Soils
			CO2325.3	Geotechnical properties of organic, peaty Soils, collapsible soils.	Identify Geotechnical properties of organic, peaty Soils, collapsible soils
			CO2325.4	Stabilizing soils using various techniques for of different soil.	Apply various techniques for stabilization of different soil.
			CO2326.1	Properties of the expansive and soft soil	Examine properties of the expansive and soft soil
5 Sem	PE-I : LAB - Soil Characterization & Identification	CV2326	CO2326.2	Characteristics of Liquefiable and filled up Soils	Explain characteristics of Liquefiable and filled up Soils
			CO2326.3	Geotechnical properties of organic, peaty Soils, collapsible soils.	Identify Geotechnical properties of organic, peaty Soils, collapsible soils
			CO2326.4	Stabilizing soils using various techniques for of different soil.	Apply various techniques for stabilization of different soil.
			CO2327.1	Fundamentals and components of Geographic Information System	Explain basic concepts, components and terminologies related to GIS.
5 Sem	PE-I : Geographical Information Systems	CV2327	CO2327.2	Various types of Spatial and Non-Spatial data and its measurement techniques.	Differentiate various types of data and its measurement techniques.
			CO2327.3	Various data Spatial and Non-Spatial models, coordinate systems, map projections, types of surfaces and operations in GIS.	Explain various data models, coordinate systems, map projections, types of surfaces and operations in GIS.
			CO2327.4	Application of GIS in civil engineering problems.	Examine the application GIS in civil engineering problems.
			CO2328.1	Fundamentals and components of Geographic Information System	Explain basic concepts, components and terminologies related to GIS.
5 Sem	PE-I : LAB - Geographic Information Systems	CV2328	CO2328.2	Various types of Spatial and Non-Spatial data and its measurement techniques.	Differentiate various types of data and its measurement techniques.
			CO2328.3	Various data Spatial and Non-Spatial models, coordinate systems, map projections, types of surfaces and operations in GIS.	Explain various data models, coordinate systems, map projections, types of surfaces and operations in GIS.
			CO2328.4	Application of GIS in civil engineering problems.	Examine the application GIS in civil engineering problems.
			CO2331.1	Basic concepts of various building services.	Associate relevance of ventilation, acoustics & to understand the methodologies.

5 Sem	OE-I : Building Services Engineering	CV2331	CO2331.2	Aspects of natural light and ventilation.	Explain special installations in buildings such as electrical, air conditioning, heating
			CO2331.3	Methods of acoustics, sound insulation and fire protection	Relate specifications & usage of mechanical installations like lifts, security systems etc.
			CO2331.4	Equipments and installations used in building services	Articulate causes of fires in buildings & their preventive and protective strategies.
5 Sem	OE-I : Construction Techniques	CV2332	CO2332.1	Fundamentals of cement & concrete.	Explain various constituents of Cement & Concrete
			CO2332.2	Construction Equipment used in Engineering.	Apply Equipements & Machinery used in Construction
			CO2332.3	Analysis of various types of structure.	Apply construction methods for various types of structure.
			CO2332.4	Construction techniques and Safety methods.	Examine new techniques used in construction, evaluation & safety methods adopted in construction operations
5 Sem	OE-I : Introduction To Environmental Management	CV2333	CO2333.1	Various analysis tools of environmental management	Explain the importance of environmental management tools.
			CO2333.2	Role of impact assessment studies in environmental management	Illustrate the procedures impact assessment studies in environmental management
			CO2333.3	Importance of environmental legislations and audit	Explain environmental legislations and policies for environmental resources.
			CO2333.4	Natural resources, challenges & prospects for sustainable development.	Explain the need of resource management and its challenges for sustainable development.
5 Sem	OE-I : Basics of Transportation Engineering	CV2334	CO2334.1	Various modes of transportation.	Explain importance of various modes of transportation.
			CO2334.2	Various characteristics of individual transportation modes.	Compare various characteristics of individual transportation modes.
			CO2334.3	Regulations as per various organizations and government bodies for the transportation sector in India.	Distinguish appropriate regulations as per various organizations and government bodies for the transportation sector in India.
			CO2334.4	Recent development in the transportation sector.	Discuss recent development in the transportation sector.
5 Sem	OE-I : BASICS OF WATER RESOURCE ENGINEERING	CV2335	CO2335.1	Hydrological processes and components of hydrological cycle.	Explain the basic concept of hydrology and various processes.
			CO2335.2	Runoff and hydrographs.	Compute various components of the hydrological processes.
			CO2335.3	Concepts of geo-hydrology and ground water recharge.	Calculate geo-hydrological parameters.
			CO2335.4		Illustrate various methods of groundwater recharge.
5 Sem	OE-I : Elements of Water Power Engineering	CV2336	CO2336.1	Hydropower Engineering, power station, hydropower schemes, and hydropower potential.	Examine fundamentals of hydropower and hydropower potential.
			CO2336.2	Intake structure and surge tank.	Explain components of intake structure and surge tank.
			CO2336.3	Hydraulic Turbine& Generator.	Determine the flow parameters of turbines.

			CO2336.4	Pump Storage Plants.	Explain the pump storage plant and its economics.
5 Sem	OE-II : Elements of Earthquake Engineering	CV2341	CO2341.1	Geological study of earth and interior.	Express the necessity and importance of earthquake engineering.
			CO2341.2	Various causes of earthquakes and their characteristics.	Examine the provision of IS codes used for earthquake-resistant design and strengthening of the structure.
			CO2341.3	Behavior of different types of structures under earthquake loading.	Illustrate the damages caused due to past earthquakes in & outside India and remedial measures.
			CO2341.4	Earthquake disaster management, mitigation, and different retrofitting techniques.	Explain the social aspects of earthquake disasters & their management.
5 Sem	OE-II : Introduction To Finite Element Method	CV2342	CO2342.1	General steps of FEM.	Explain the concepts of FEM.
			CO2342.2	Derivation for shape functions.	Illustrate elemental equations using the concepts of FEM.
			CO2342.3	Parametric formulation in FEM.	Analyze engineering problems using FEM.
			CO2342.4	Storage techniques and numerical integration	Apply numerical integration using FEM.
5 Sem	OE-II : Air Pollution and Solid Waste Management	CV2343	CO2343.1	Air pollution episodes, air pollutants, their sources & effects.	Classify the type, sources & effect of air pollutants.
			CO2343.2	Meteorological parameters, air sampling & measurement of pollutants.	Explain the parameters affecting air pollution and various methods of measurement.
			CO2343.3	Air pollution controlling technologies, air pollution due to automobiles & general Idea of noise pollution	Illustrate various air pollution control equipments & pollution caused due to automobile exhaust and basics of noise pollution.
			CO2343.4	Solid waste management by processing, treatment, disposal & reuse of solid waste.	Interpret the concepts of solid waste management, treatment and disposal methods.
5 Sem	OE-II : Environmental & Social Impact Assessment	CV2344	CO2344.1	Evolution of EIA.	Explain the EIA process, analyse major environmental issues for development projects.
			CO2344.2	Methods of impact assessment and assessment of impact of air and noise environment.	Examine model tasks within an EIA cycle.
			CO2344.3	Assessment of impact on cultural and socioeconomic environment.	Construct portions of environmental documents through administrative and legal requirements.
			CO2344.4	EIA notification.	Illustrate the standards of professional practice about EIA.
5 Sem	OE-II : Disaster Management	CV2345	CO2345.1	The nature & types of disaster.	Distinguish the nature & types of disaster.
			CO2345.2	Role of different government & social agencies in disaster management	Report its preparedness, role of different government & social agencies.
			CO2345.3	Risk & cost assessment of disaster management	Predict the extent of risk and cost assessment.
			CO2345.4	Disaster management cycle.	Conclude provisions, management of disaster, post disaster condition & its management

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Nagar Yuwak Shikshan Sanstha's

Yeshwantrao Chavan College of Engineering

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Department of Civil Engineering

Session 2021-22

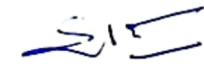
SEM	Course Name	Code	CO	Course Objectives	Course Outcomes
6 Sem	Fundamentals of economics	GE2312	CO2312.1	The concept of economics and provides knowledge about consumer's rational behavior.	Discover the knowledge of various fundamental concepts of economics
			CO2312.2	Learn the various factors of production and its role in production.	Interpret the concept of microeconomics.
			CO2312.3	Knowledge of market structure, demand and revenue curves.	Generalize the ideas of macroeconomic.
			CO2312.4	National income, its counting with respect to various factors.	Describe national and international trade.
				Functioning of money, financial institution and various sources of public finance/revenue.	
				International economics, foreign trade and various international financial institution.	
6 Sem	Steel Structures	CV2351	CO2351.1	Structural steel components & its connection.	Explain type of structure and its design methodology
			CO2351.2	Tension member, compression member, lacing and batten built-up sections.	Calculate different types of loading with respect to structural parameters.
			CO2351.3	Laterally restrained and unrestrained beams	Apply Indian Standard code for design of steel structure components.
			CO2351.4	Pre-Engineered Building and column bases	Analyze and design Steel simple, built-up sections and column bases
6 Sem	LAB : Building Design and Drawing	CV2352	CO2352.1	Turbulent flow through pipe running under full condition & Uniform flow, non-uniform flow in open Channel	Draw various orthographic views of a building using drawing instruments and by free hand sketches.
			CO2352.2	Analysis of the water distribution network and flow around the submerged body.	Apply principles of planning and building bye-laws to draw working and submission drawings of a building.
			CO2352.3	Practical flow profiles in open channel	Draw perspective view of a building and its elements.
			CO2352.4	Flow profile length in open channel	Use software used for building drawing to draw submission and working drawings
6 Sem	Hydraulic Engineering	CV2353	CO2353.1	Turbulent flow through pipe running under full condition & Uniform flow, non-uniform flow in open Channel	Calculate various losses, discharges, pressure, in flow through pipe and various flow parameter in open channel
			CO2353.2	Analysis of pipe network in water distribution system and most efficient channel section for conveyance of water	Analyze the water distribution network by using Hardy Cross Method and most efficient channel section for conveyance of water
			CO2353.3	Fundamental study of physical quantity and relation between various physical quantity.	Apply Buckingham's Pi theorem to establish relation between various physical quantities.
			CO2353.4	Flow over notches and weirs in channel	Compute the discharges in channel by using notches and weirs

6 Sem	LAB : Hydraulic Engineering	CV2354	CO2354.1	Turbulent flow through pipe running under full condition & Uniform flow, non-uniform flow in open Channel	Calculate various losses, velocity, discharges, pressure, in flow through pipe and various flow parameter in open channel
			CO2354.2	Analysis of the water distribution network and flow around the submerged body.	Analyze water distribution network and flow around the submerged body
			CO2354.3	Practical flow profiles in open channel	Analyze various flow profiles, in open channel
			CO2354.4	Flow profile length in open channel	Calculate profile length by using Direct step method
6 Sem	Foundation Engineering	CV2355	CO2355.1	Geotechnical site investigation	Explain planning and implementation of a site investigation.
			CO2355.2	Bearing capacity of foundations	Evaluate the bearing capacity for shallow and deep foundation design.
			CO2355.3	Lateral earth pressure and stability of slopes.	Calculate the lateral earth pressure for retaining wall.
			CO2355.4	Different methods of ground improvement.	Describe different techniques for ground improvement and slopes stability analysis
6 Sem	Industry Visit and Its Report	CV2360	CO2360.1	Problems on Mathematics, Profit and loss, ratio and proportion, simple and compound interest etc.	Make detailed notes and reports.
			CO2360.2	Coding decoding, cubes cutting, syllogisms, data interpretation etc.	Compute the problems on quants.
			CO2360.3	Articles, Sentence correction, para jumbles, vocabulary, verbal reasoning	Illustrate the problems on logical, technical and verbal
			CO2360.4	Logical development through program solving, python basics, Matrix, number system etc.	Apply the field knowledge to the practical applications.
6 Sem	PE-I : Building Services	CV2361	CO2361.1	Concepts of building services.	Articulate relevance of plumbing services, causes of fire and protection strategies.
			CO2361.2	Aspects of natural light, ventilation, acoustics	Simulate special installations in buildings. relevance of lighting, ventilation & acoustics
			CO2361.3	Equipment and installations used in building services	Illustrate specifications, usage of mechanical installations and facilities for physically challenged, aged people.
			CO2361.4	Causes of Fires and protective strategies	Explain water treatment services.
6 Sem	PE-II : New Engineering Materials	CV2362	CO2362.1	Discuss various civil engineering materials.	Discuss various civil engineering materials.
		CV2362	CO2362.2	Differentiate various methods of testing of materials.	Differentiate various methods of testing of materials.
		CV2362	CO2362.3	Learn principles of the composite section and its uses.	Learn principles of the composite section and its uses.
6 Sem	PE-II : Construction Management and Machinery	CV2363	CO2363.1	The concepts related with Construction industry, management and legal laws.	Understand and analyze scope and role of civil engineer in developing economy of Nation and construction industry.
			CO2363.2	Basic principles of Construction Management & networking techniques (CPM and PERT) of project controlling in the context of various construction aspects.	Evaluate the development of network technique of major projects, material and equipment and its safety management.
			CO2363.3	Project resources and its scarcity, management functions to control and analysis of equipment and material management.	Develop knowledge about quality and finance management system carried out in industry.
			CO2363.4	Various equipment of drilling-blasting techniques, concrete equipment and basics of economics.	Classify various major construction equipment used in construction and economics of demand and supply.
			CO2364.1	Geological study of earth and interior.	Explain the fundamentals and Importance of Earthquake Engineering

6 Sem	PE-II : Earthquake Engineering	CV2364	CO2364.2	Various aspects of tall structures.	Analyze and design the earthquake resistant structures and construction in accordance with the Provisions of Indian Standard Codes
			CO2364.3	Detailing of RCC members for ductile behavior as IS code provisions.	Explain special aspects in Multi-story buildings.
			CO2364.4	Various effects of earthquakes on structures.	Illustrate the damages caused due to past Earthquake in & outside India and remedial Measures
6 Sem	PE-II : Optimization Techniques	CV2365	CO2365.1	Optimization problems & Formulation of structural problems.	Explain the need of optimization techniques in engineering.
			CO2365.2	Classical optimization techniques.	Examine the optimization techniques used in engineering design
			CO2365.3	Linear Programming for optimization.	Apply the optimization techniques in engineering problem.
			CO2365.4	Non - Linear Programming for One dimensional minimization.	Analyze Nonlinear programming one dimensional minimization.
6 Sem	PE-II : Introduction To Remote Sensing	CV2366	CO2366.1	Fundamentals of Remote sensing, GIS and GPS	Illustrate the principles of Remote sensing, GIS and GPS
			CO2366.2	Elements of Remote sensing, GIS and GPS.	Explain the role of various elements of Remote sensing, GIS and GPS.
			CO2366.3	The knowledge of Geoinformatics for various surveys, information extraction.	Interpret the process of data acquisition in remote sensing, GIS and GPS.
			CO2366.4	The application of Remote sensing and GIS in various fields.	Illustrate the use of remote sensing and GIS in various Civil Engineering Applications.
6 Sem	PE-II : Environmental Geotechniques	CV2367	CO2367.1	Geo-environmental engineering.	Analyse Geoenvironmental problems.
			CO2367.2	Soil-water interaction	Examine soil-water interaction and its implications.
			CO2367.3	Waste Containment System and contaminant site remediation.	Explain Waste Containment System and contaminant site remediation.
			CO2367.4	Soil characterization.	Illustrate soil characterization.
6 Sem	PE-II : Traffic Engineering	CV2368	CO2368.1	Calculations of spot speed, journey time & running time.	Compute the measurement of spot speed journey speed & running speed for different methods
			CO2368.2	Different statistical methods such as Binomial, Normal Poission, Chisquare to know the probabilities at various levels.	Analyse the different Statistical methods used in various traffic studies
			CO2368.3	Analysis and designs of rotary intersections, Parking& Accidents	Illustrate Rotary Intersections, Parking & accidents
			CO2368.4	Different traffic signs , methods of design of traffic signals & Queuing theory	Calculate the total time at Signals at various intersections.
6 Sem	PE-II : Water Transmission & Distribution System	CV2369	CO2369.1	Pipe flow, valves and its operation, pumps, reservoirs and its capacity.	Compute discharges in three reservoir, multi reservoir system, capacity of reservoir and design of Rising main.
			CO2369.2	Analysis of water distribution network	Analyze the water distribution network by using Hardy cross method, Newtonian Raphson method and Node flow analysis
			CO2369.3	Design of water distribution network and rising main	Apply Graph Theory, Critical path method and Spanning tree concept for design of water distribution network.

			CO2369.4	Optimization of water distribution network	Analyze optimized solution of water distribution network by using Cost Head Loss ratio Method
6 Sem	OE-III : Building Services Engineering	CV2371	CO2371.1	Basic concepts of various building services.	Associate relevance of ventilation, acoustics & to understand the methodologies
			CO2371.2	Aspects of natural light and ventilation	Explain special installations in buildings such as electrical, air conditioning, heating
			CO2371.3	Methods of acoustics, sound insulation and fire protection	Relate specifications & usage of mechanical installations like lifts, security systems etc.
			CO2371.4	Equipments and installations used in building services	Articulate causes of fires in buildings & their preventive and protective strategies.
6 Sem	OE-III : Construction Techniques	CV2372	CO2372.1	Fundamentals of cement & concrete.	Explain various constituents of Cement & Concrete.
			CO2372.2	Construction Equipment used in Engineering.	Apply Equipments & Machinery used in Construction.
			CO2372.3	Analysis of various types of structure.	Apply construction methods for various types of structure.
			CO2372.4	Construction techniques and Safety methods.	Examine new techniques used in construction, evaluation & safety methods adopted in construction operations
6 Sem	OE-III : Introduction To Environmental Management	CV2373	CO2373.1	Various analysis tools of environmental management	Explain the importance of environmental management tools.
			CO2373.2	Role of impact assessment studies in environmental management	Illustrate the procedures impact assessment studies in environmental management
			CO2373.3	Importance of environmental legislations and audit	Explain environmental legislations and policies for environmental resources.
			CO2373.4	Natural resources, challenges & prospects for sustainable development.	Explain the need of resource management and its challenges for sustainable development.
6 Sem	OE-III : Basics of Transportation Engineering	CV2374	CO2374.1	Various modes of transportation.	Explain importance of various modes of transportation.
			CO2374.2	Various characteristics of individual transportation modes.	Compare various characteristics of individual transportation modes.
			CO2374.3	Regulations as per various organizations and government bodies for the transportation sector in India.	Distinguish appropriate regulations as per various organizations and government bodies for the transportation sector in India.
			CO2374.4	Recent development in the transportation sector.	Discuss recent development in the transportation sector.
6 Sem	OE-III : BASICS OF WATER RESOURCE ENGINEERING	CV2375	CO2375.1	Hydrological processes and components of hydrological cycle.	Explain the basic concept of hydrology and various processes.
			CO2375.2	Runoff and hydrographs.	Compute various components of the hydrological processes.
			CO2375.3	Concepts of geo-hydrology and ground water recharge.	Calculate geo-hydrological parameters.
			CO2375.4		Illustrate various methods of groundwater recharge.
			CO2376.1	Hydropower Engineering, power station, hydropower schemes, and hydropower potential.	Examine fundamentals of hydropower and hydropower potential.

6 Sem	OE-III : Elements of Water Power Engineering	CV2376	CO2376.1	Hydropower Engineering, power station, hydropower schemes, and hydropower potential	Examine fundamentals of hydropower and hydropower potential
			CO2376.2	Intake structure and surge tank.	Explain components of intake structure and surge tank.
			CO2376.3	Hydraulic Turbine & Generator.	Determine the flow parameters of turbines.
			CO2376.4	Pump Storage Plants.	Explain the pump storage plant and its economics.
6 Sem	OE-IV : Elements of Earthquake Engineering	CV2381	CO2381.1	Geological study of earth and interior.	Express the necessity and importance of earthquake engineering.
			CO2381.2	Various causes of earthquakes and their characteristics.	Examine the provision of IS codes used for earthquake-resistant design and strengthening of the structure.
			CO2381.3	Behavior of different types of structures under earthquake loading.	Illustrate the damages caused due to past earthquakes in & outside India and remedial measures
			CO2381.4	Earthquake disaster management, mitigation, and different retrofitting techniques.	Explain the social aspects of earthquake disasters & their management.
6 Sem	OE-IV : Introduction To Finite Element Method	CV2382	CO2382.1	General steps of FEM.	Explain the concepts of FEM.
			CO2382.2	Derivation for shape functions.	Illustrate elemental equations using the concepts of FEM.
			CO2382.3	Parametric formulation in FEM.	Analyze engineering problems using FEM.
			CO2382.4	Storage techniques and numerical integration	Apply numerical integration using FEM.
6 Sem	OE-IV : Air Pollution and Solid Waste Management	CV2383	CO2383.1	Air pollution episodes, air pollutants, their sources & effects	Classify the type, sources & effect of air pollutants.
			CO2383.2	Meteorological parameters, air sampling & measurement of pollutants	Explain the parameters affecting air pollution and various methods of measurement.
			CO2383.3	Air pollution controlling technologies, air pollution due to automobiles & general Idea of noise pollution	Illustrate various air pollution control equipments & pollution caused due to automobile exhaust and basics of noise pollution.
			CO2383.4	Solid waste management by processing, treatment, disposal & reuse of solid waste.	Interpret the concepts of solid waste management, treatment and disposal methods.
6 Sem	OE-IV : Environmental & Social Impact Assessment	CV2384	CO2384.1	Evolution of EIA.	Explain the EIA process, analyse major environmental issues for development projects.
			CO2384.2	Methods of impact assessment and assessment of impact of air and noise environment.	Examine model tasks within an EIA cycle.
			CO2384.3	Assessment of impact on cultural and socioeconomic environment	Construct portions of environmental documents through administrative and legal requirements.
			CO2384.4	EIA notification.	Illustrate the standards of professional practice about EIA.
6 Sem	OE-IV : Disaster Management	CV2385	CO2385.1	The nature & types of disaster.	Distinguish the nature & types of disaster.
			CO2385.2	Role of different government & social agencies in disaster management	Report its preparedness, role of different government & social agencies.
			CO2385.3	Risk & cost assessment of disaster management	Predict the extent of risk and cost assessment.
			CO2385.4	Disaster management cycle.	Conclude provisions, management of disaster, post disaster condition & its management



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SEM	Course Name	Code	CO	Course Objectives	Course Outcomes
7 Sem	Estimating and Costing	CV2401	CO2401.1	The importance of subject and definition involved in the estimation of various structures.	Explain the definitions involved in estimates of structures.
			CO2401.2	The writing and developing detailed specification of items and quantities of various materials in different items. The concept of valuation, methods of valuation and rent fixation.	Illustrate the specifications and quantities of materials in different items to prepare the estimate.
			CO2401.3	The estimates of buildings (Load bearing and framed structure), road, hill road and canal.	Calculate the valuation and rent of civil engineering structures.
			CO2401.4	The procedure of submitting the tenders and types of contracts.	Estimate the quantity and costing of building, road, hill road and canal.
			CO2401.5		Explain the tenders and carry out the construction of civil engineering structures.
7 Sem	Lab: Estimating and Costing	CV2402	CO2402.1	Understand IS 1200, Tender documents and conditions of contracts.	Illustrate the specifications and quantities of materials in different items to prepare the estimate.
			CO2402.2	Understand specifications and rate analysis in details.	Estimate the quantities in buildings and roads.
			CO2402.3	Estimate of buildings and earthwork of roads.	Estimate the quantities of doors, windows, and steel in RCC beams and slabs.
			CO2402.4	Estimate of woodwork for doors, windows and reinforcement in RCC Beam and Slabs.	Explain the tender documents and conditions of contracts.
7 Sem	Waste Water Engineering	CV2403	CO2403.1	Methods of collection & conveyance of sewage.	Explain the collection and conveyance of sewage.
			CO2403.2	Sewer appurtenances and construction of sewer.	Construct sewerage system including house drainage system.
			CO2403.3	Treatment methods for municipal, industrial & rural wastewater.	Analyze the wastewater characteristics, treatment units and design of primary treatment units.
			CO2403.4	Different causes of air pollution and its control methods.	Examine the air pollution effects and methods of control
7 Sem	Hydrology & Water Resources Engineering	CV2404	CO2404.1	Hydrological cycle, measurement of runoff and hydrographs.	Determine the surface water runoff and ordinates of hydrographs.
			CO2404.2	Crop water requirements.	Compute water requirement for various crop pattern.
			CO2404.3	Reservoir planning and design of canal network and flood analysis.	Explain parameters and procedures adopted in reservoir planning and analysis of flood occurrence.
			CO2404.4	Diversion headwork, earthen dam and gravity dam.	Analyze of Gravity Dam, earthen dam and design of water conveyance canal system.
7 Sem	Mini Project {SACM}	CV2409	CO2409.1	Application of mathematics, science, and engineering in a global, economic, environmental, and societal context.	Illustrate a sound technical knowledge of their selected project topic.
			CO2409.2	Design a model, a system or components and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2409.3	Teamwork and independent functioning of professional and ethical responsibility and life-long learning.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2409.4	Effective communication and use the techniques, skills, and modern engineering tools and contemporary issues necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze, design and cost estimates of civil engineering structures.	
7 Sem	Mini Project {WP & WRE}	CV2409	CO2409.1	Apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.	Illustrate a sound technical knowledge of their selected project topic.
			CO2409.2	Design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2409.3	Relate on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2409.4	Apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.	

7 Sem	Mini Project {GT}	CV2409	CO2409.1	Apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.	Illustrate a sound technical knowledge of their selected project topic.
			CO2409.2	Design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2409.3	Relate on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2409.4	Apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.	
7 Sem	Mini Project {TE}	CV2409	CO2409.1	Apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.	Illustrate a sound technical knowledge of their selected project topic.
			CO2409.2	Design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2409.3	Relate on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2409.4	Apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.	
7 Sem	CRT	CV2410	CO2410.1	Problems on Mathematics, Profit and loss, ratio and proportion, simple and compound interest etc.	Make detailed notes and reports.
			CO2410.2	Coding decoding, cubes cutting, syllogisms, data interpretation etc.	Compute the problems on quants
			CO2410.3	Articles, Sentence correction, para jumbles, vocabulary, verbal reasoning	Illustrate the problems on logical, technical and verbal
			CO2410.4	Logical development through program solving, python basics, Matrix, number system etc.	Apply the field knowledge to the practical applications.
7 Sem	PE-III Prestressed Concrete	CV2411	CO2411.1	Concepts of prestressed concrete.	Explain the concepts of Prestressed concrete.
			CO2411.2	IS codes related to prestressed concrete.	Apply the knowledge of IS codes related to Prestressed concrete.
			CO2411.3	Analysis and design of the basic structural members in Prestressed concrete.	Analyze and design the basic structural members in Prestressed concrete.
			CO2411.4	Limit state of serviceability to prestressed concrete members.	Examine the limit state of serviceability to Prestressed concrete members.
7 Sem	Advanced RCC	CV2412	CO2412.1	IS codes and IRC codes required for design of advanced concrete structures.	Explain the provisions of relevant IS codes and IRC codes required for design of advanced concrete structures.
			CO2412.2	Concept of different IRC loading and design of bridge and culverts	Analyze problems on building frames subjected to vertical load & horizontal load.
			CO2412.3	Design methods of multistoried building frame, water tank, retaining wall.	Analyze advanced concrete structures such as multistoried buildings, retaining wall, bridge, water tank, flat slab
			CO2412.4	RCC detailing of structures.	Illustrate RCC detailing of structures.
7 Sem	Energy Conversion & Management	CV2415	CO2415.1	Conventional and non-conventional energy sources and its scenario	Explain different sustainable energy sources
			CO2415.2	Energy management and the importance of energy conservation.	Analyze energy management and importance of energy conversion.
			CO2415.3	Energy conversion technologies and techniques of energy analysis.	Explain different energy conversion method.
			CO2415.4	Elements of Energy management systems.	Select modern technologies of Waste to Energy conversion
7 Sem	PE-III : Geotechnical Investigation & Ground Improvement Technic	CV2416	CO2416.1	Important methods of soil exploration and interpretation of the results.	Explain various methods of soil exploration and Field investigations.
			CO2416.2	Methods of ground improvement.	Apply various methods of ground improvement
			CO2416.3	Use of geosynthetics materials.	Implement geosynthetic materials and Diaphragm wall in construction
				Diaphragm wall	
7 Sem	PE-III : Urban Transportation Planning	CV2418	CO2418.1	Basics of the transportation planning process.	Explain basics of the transportation planning process.
			CO2418.2	Various methods of forecasting and discuss environmental impacts caused by traffic.	Illustrate various methods of forecasting and discuss environmental impacts caused by traffic.
			CO2418.3	Importance and factors governing trip generation and various methods of trip distribution.	Explain factors governing trip generation and various methods of trip distribution.
			CO2418.4	Various traffic regulations, enforcements and traffic management approaches.	Explain various traffic regulations, enforcements and traffic management approaches.

7 Sem	PE II: Advanced Hydraulics	CV2419	CO2419.1	Uniform flow, critical flow and transition in channel.	Calculate various flow parameters in open channel.
			CO2419.2	GVF, flow profiles in channel, profile length by various methods.	Analyze the practical flow profiles and profile length in open channel.
			CO2419.3	Hydraulic similitude and model investigation	Apply model theory to know in advance the performance of prototype.
			CO2419.4	Unsteady flow and rigid water column theory for pipe flow.	Compute time flow establishment for unsteady flow and water hammer pressure in pipe flow
7 Sem	Finite Element Method	CV2422	CO2422.1	Variational principle and Rayleigh Ritz Method used in finite element method.	Explain principles of finite element method.
			CO2422.2	Shape functions and its use in Finite Element Formulation	Apply principles of FEM for derivation of element equations
			CO2422.3	Natural coordinates and Isoparametric elements used finite element method.	Analyze civil engineering problems by finite element method.
			CO2422.4	Mathematical modelling techniques and solution steps by using software.	Illustrate mathematical modeling and solution techniques in FEM
7 Sem	Introduction to Structural Dynamics	CV2423	CO2423.1	Discrete single-degree and multiple-degree vibratory systems and calculate the free and forced response of these systems.	Analyze knowledge of mathematics, science, and engineering by developing the equations of motion for vibratory systems
			CO2423.2	Interpret the mode shapes and frequencies for the free response of continuous vibratory systems.	Solve engineering problems having motions varying with time.
			CO2423.3	Make modeling continuous vibratory systems – vibration of strings, axial and torsional vibration of bars and beams	Analyze a vibratory structure, in order to achieve specified requirements.
			CO2423.4		Relate the importance of understanding how structural vibrations may affect safety and reliability of engineering systems.
7 Sem	Environmental Legislation & Management System	CV2425	CO2425.1	Concept of environmental policies, principles, agreements.	Explain legal aspects for environment protection.
			CO2425.2	Provisions in various environmental acts.	Analyze legal provisions in various environmental acts.
			CO2425.3	Fundamentals of environmental management and ISO 14000 series.	Illustrate environmental management plans, principles and standards
			CO2425.4	Legal judgements in several cases	Explain powers of government, board & court judgment
7 Sem	Advanced Foundation Engineering	CV2426	CO2426.1	Various bearing capacity theories of shallow foundation	Apply various bearing capacity theories of shallow foundation
			CO2426.2	Foundation Settlement	Calculate foundation settlement
			CO2426.3	Geotechnical design of shallow and deep foundations.	Apply geotechnical design of shallow and deep foundations.
			CO2426.4	Machine foundation and Well foundation.	Explain machine foundation and well foundation.
7 Sem	PE IV Advance Transportation Engineering	CV2428	CO2428.1	Development of railway and its terminology.	Illustrate the importance of railway transportation and its terminologies
			CO2428.2	Geometric design of railway track	Analyze and design the geometric element of railway track
			CO2428.3	Development of air transportation in India	Explain terminologies of air transportation
			CO2428.4	Tunnel engineering	Explain about tunnel engineering.
7 Sem	PE III Watershed Management	CV2429	CO2429.1	Watershed characteristics, and Principles of watershed management.	Explain the watershed characteristics and need of watershed management.
			CO2429.2	Soil erosion and relationship between soil and water.	Classify soil and soil erosion and relate the relationship between soil and water.
			CO2429.3	Watershed management components and conservation practices.	Analyze Watershed management components and implement water conservation techniques.
			CO2429.4	Monitoring and Modeling in Watershed management.	Compare watershed Modeling techniques and monitoring tools.
7 Sem	Maintenance and Rehabilitation Engineering	CV2431	CO2431.1	Various maintenance works in civil engineering structures.	Explain Maintenance & Rehabilitation techniques for improve condition of existing structures.
			CO2431.2	Methods & techniques apply for maintenance in structures	Analyze factors Affecting Frequency and Magnitude of Maintenance Work
			CO2431.3	Planning & management of Maintenance & Rehabilitation work.	Apply various smart materials used in rehabilitation of structures.
			CO2431.4		Explain different available repairing techniques with specialized materials
7 Sem	PE-V: Project Planning & Management	CV2432	CO2432.1	Planning of project and execution of different construction projects.	Apply the knowledge of planning & Execution of construction projects.
			CO2432.2	Principles of Construction Scheduling & Network Analysis.	Explain Construction Scheduling & Network Analysis.
			CO2432.3	Development of projects by managing Quality & safety measures.	Explain the quality control aspect in planning & management with safety provisions.
			CO2432.4	Legal aspect in project management & various laws.	Explain the legal aspects & various laws in construction projects.
7 Sem	PE V Advanced Steel Design	CV2434	CO2434.1	Eccentric and moment resistant connection.	Explain the type of structure and its design methodology.
			CO2434.2	Plate girder and its design	Calculate different types of loading with respect to structural parameters.
			CO2434.3	Roof trusses and analysis for industrial shed.	Apply Indian Standard code provisions for designing advanced steel structure components
			CO2434.4	Bridges, bearings and design of foot bridge.	Analyze and design Steel built-up sections and truss members.

7 Sem	PE-V DESIGN OF BRIDGE STRUCTURES	CV2435	CO2435.1	Evolution of bridges, their classification and components of bridges.	Illustrate various types of bridges, loading conditions and their components.
			CO2435.2	Various types of bridges, loading conditions and load combinations as per IRC.	Distinguish and analyze superstructure and substructure as per design standards.
			CO2435.3	Design consideration of various types of culverts, bridges and its substructure - superstructure components.	Compare the suitability of long span bridges.
				Basics of Suspension and Cable stayed bridges	
7 Sem	PE-V : Pavement Design	CV2438	CO2438.1	Classification of various types of pavement, different design parameters and specifications for flexible and rigid pavements.	Explain various types of pavement, different design parameters and specifications for flexible and rigid pavements.
			CO2438.2	Various specification and standard for highway and airfield constructions and pavement management system.	Analyze and design flexible and rigid pavements.
			CO2438.3	Analysis and design of flexible and rigid pavements.	Explain various specification and standard for highway and airfield constructions and pavement management system.
			CO2438.4	Pavement condition evaluation and techniques for strengthening of the pavement.	Examine pavement condition and Explain techniques for strengthening of the pavement.
7 Sem	PE V Structural Engineering Practices	CV2440	CO2440.1	Structural Engineering Practices and pre-requisites in initiating structural design	Articulate structural engineering practices and pre-requisites.
			CO2440.2	Various standards and specifications frequently referred by Structural Engineers and their use in practice	Apply relevant standards and software related to structural design.
			CO2440.3	Architectural plans, structural analysis and design of structural elements, identification of points for discussion between an architect and structural designer.	Explain important construction processes related to structural members.
			CO2440.4	Design the RCC building and prepare structural drawings.	Analyze and design building components and prepare detailed structural drawings

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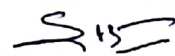
Yeshwantrao Chavan College of Engineering

(An Autonomous Institution affiliated to Rashtrasant Tukadoji Maharaj Nagpur University)

Department of Civil Engineering

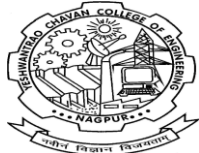
Session 2021-22

SEM	Course Name	Code	CO	Course Objectives	Course Outcomes
8 Sem	Major Project {SACM}	CV2451	CO2451.1	Application of mathematics, science, and engineering in a global, economic, environmental, and societal context.	Illustrate a sound technical knowledge of their selected project topic.
			CO2451.2	Design a model, a system or components and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2451.3	Teamwork and independent functioning of professional and ethical responsibility and life-long learning.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2451.4	Effective communication and use the techniques, skills, and modern engineering tools and contemporary issues necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze, design and cost estimates of civil engineering structures.	
8 Sem	Major Project {WP & WRE}	CV2451	CO2451.1	Apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.	Illustrate a sound technical knowledge of their selected project topic.
			CO2451.2	Design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2451.3	Relate on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2451.4	Apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.	
8 Sem	Major Project {GT}	CV2451	CO2451.1	Apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.	Illustrate a sound technical knowledge of their selected project topic.
			CO2451.2	Design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2451.3	Relate on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2451.4	Apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.	
8 Sem	Major Project {TE}	CV2451	CO2451.1	Apply knowledge of mathematics, science and engineering in a global, economic, environmental and societal context and engage in life-long learning.	Illustrate a sound technical knowledge of their selected project topic.
			CO2451.2	Design a model, a system or components considering environmental, economic, social, political, ethical and sustainability and analyze and interpret the data.	Write problem identification, formulation and solution.
			CO2451.3	Relate on multidisciplinary teams, tackle engineering problems, understand professional and ethical responsibility and communicate effectively.	Design engineering solutions to complex problems utilizing a systems approach including ability to work in a team.
			CO2451.4	Apply knowledge of contemporary issues and use the techniques, skills, and modern engineering tools necessary for engineering practices.	Express effectively to discuss and solve engineering problems.
				Analyze and design RCC & steel structures, draw and prepare cost estimates of civil engineering structures.	
8 Sem	Extra / Co-Curricular / Competitive Examination	CV2452	CO2452.1	To plan extracurricular events in order to foster a competitive spirit, teamwork, leadership, diligence, punctuality, and a sense of belonging among students.	Develop leadership through the engagement of collaboration, and then put it into action to complete the task
			CO2452.2	Foster the development of creative ability, self-confidence, and a sense of accomplishment.	Employ with a diverse range of individuals.
			CO2452.3	Designing procedures that consider environmental, social, political, ethical, and health and safety considerations.	Operate to the advancement of society and the identification of health-related problems
			CO2452.4	—	Produce independently as well as member of a team in order to achieve established goals


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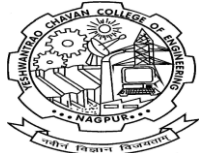
Mechanical Engineering



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DEPARTMENT OF MECHANICAL ENGINEERING
2021-22

2.6.1 Course Outcomes (COs) all courses

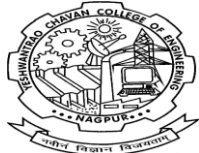
Sem.	Course Code	Course Title	CO	Co Contains
3 rd Semester	ME 2201 / LAB ME 2202	MATERIAL SCIENCE & METALLURGY	CO 1	Understand microstructure and apply the effect of crystalline nature of metals
			CO 2	Understand Iron-Iron carbide equilibrium diagram and analyse microstructure, general properties and heat treatment practices of commercial Steels and Cast iron.
			CO 3	Understand various heat treatment process for material
			CO 4	Understand the basics of powder Metallurgy for powder Metallurgical components
3 rd Semester	ME 2203 / LAB ME 2204	MACHINING PROCESSES	CO 1	Distinguish among various cutting tool materials and tool geometries.
			CO 2	Examine the different processes and machine tools for cylindrical surface machining.
			CO 3	Differentiate various machining processes and conditions for flat surface machining using SPCT.
			CO 4	Justify machining processes for flat surfaces machining using MPCT
3 rd Semester	ME- 2205 / LAB ME 2206	MECHANICS OF MATERIALS	CO 1	Apply the basic concepts of stress, strain and their variations under different types of loading to calculate Stresses.
			CO 2	Apply the basic concepts involved in mechanics of materials, bending moment, shear force, stresses in beams to solve complex problems
			CO 3	Analyze strain energy, impact loading and crippling load in column and struts.
			CO 4	Evaluate the torsional shear stress in shaft and solve the problem on Slope and deflection in beams under different loading and support conditions.
3 rd Semester	ME- 2207	KINEMATICS OF MACHINERY	CO 1	Interpret the various kinematic concepts in different mechanisms
			CO 2	Analyze the velocity and acceleration of links at any point in various mechanisms.
			CO 3	Construct the various cam profiles manually in accordance to the follower motion
			CO 4	Solve the problems related to gear and gear trains
3 rd Semester	ME- 2208 / LAB ME2209	FLUID MECHANICS	CO 1	Apply the knowledge of various fluid properties and evaluate hydrostatic forces acting on submerged flat bodies
			CO 2	Apply the knowledge of Kinematics to fluid flow and evaluate Velocity, acceleration and various function of Fluid Flow
			CO 3	Analyze and evaluate real flow problems by applying Bernoulli's equations and momentum equations.
			CO 4	Apply the knowledge of fluid flow over bodies to analyze and evaluate the Forces acting on bodies
5th SEMESTER				
5 th SEMESTER	ME- 2301 / LAB ME2302	HEAT TRANSFER	CO 1	Analyze unidirectional steady state heat conduction systems to evaluate the heat transfer rate and/or other involved parameters.
			CO 2	Select and Apply the empirical correlations in convection and phase change processes to estimate the heat transfer coefficient and/or other involved parameters.
			CO 3	Analyze the heat exchangers applying the LMTD & ϵ -NTU methods for sizing and rating problems.
			CO 4	Examine and evaluate the net thermal radiation exchange between surfaces and/or surroundings and estimate radiation view factors and/or other involved parameters, using tables, graphs and the view factor relationships.



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2.6.1 Course Outcomes (COs) all courses

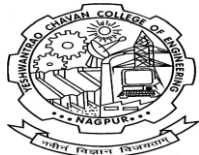
Sem.	Course Code	Course Title	CO	Co Contains
5 th SEMESTER	ME- 2301 /LAB ME2302	DYNAMICS OF MACHINERIES	CO 1	Analyze unidirectional steady state heat conduction systems to evaluate the heat transfer rate and/or other involved parameters.
			CO 2	Select and Apply the empirical correlations in convection and phase change processes to estimate the heat transfer coefficient and/or other involved parameters.
			CO 3	Analyze the heat exchangers applying the LMTD & ϵ -NTU methods for sizing and rating problems.
			CO 4	Examine and evaluate the net thermal radiation exchange between surfaces and/or surroundings and estimate radiation view factors and/or other involved parameters, using tables, graphs and the view factor relationships.
5 th SEMESTER	ME- 2305	PRODUCTIO N MANAGEME NT	CO 1	Estimate ,evaluate and analyze production system using work study.
			CO 2	Design and evaluate plant layouts..
			CO 3	Predict and evaluate future demand using forecasting.
			CO 4	Estimate production costing and apply by judging production planning and control..
7th SEMESTER				
7 th SEMESTER	ME- 2401 /LAB ME2202	AUTOMATION	CO 1	Design and evaluate a balanced line for production and assembly system.
			CO 2	Evaluate and apply CNC manual and APT programs for various operations.
			CO 3	Evaluate the application of industrial robotics and automated material handling in automated production system.
			CO 4	Apply the concepts of CAQC,CAPP and GT to the development of FMS.
7 th SEMESTER	ME- 2412	ADDITIVE MANUFACTURING	CO 1	Understand the basics of AM
			CO 2	Categorize the AM technologies with materials.
			CO 3	Evaluate the parameters for process selection and control.
			CO 4	Summarize the PM methods
7 th SEMESTER	ME- 2414	PE 2 - Refrigeration and Air Conditioning	CO 1	CO-1:- Interpret the psychrometric properties of air and Processes, Select & apply the various psychrometric process to live problem.
			CO 2	CO-2:- Design and analyze the air distribution system.
			CO 3	CO-3:- Interpret and analyze a various types Refrigerants and VCRS refrigeration systems
			CO 4	CO-4:- Interpret the various absorption Refrigeration system and Cryogenic system.
7 th SEMESTER	ME- 2417	PE 2 - Advanced Manufacturing Technique	CO 1	Establish Economical benefits, social utility and areas of utilization of tribological concept and associated problem.
			CO 2	Articulate the detailed operation of Tribological components and their utility in engineering industry.
			CO 3	Evaluate concept of friction, lubrication, and wear processes and its utility in designing tribological components.
			CO 4	Analyze and select energy efficient tribological system for optimal performance
7 th SEMESTER	ME- 2418	PE 2 - Optimization Techniques	CO 1	Apply basic operations research techniques to formulate given situation as LPP and Solve by graphical & simplex method.
			CO 2	Solve Transportation and Assignment Models and Analyze the concept of dynamic programming to Solve problems of discreet and continuous variables.
			CO 3	Analyze projects for minimum total cost and smooth level of resources.
			CO 4	Review of different replacement policies and its application in operation research and analyze application of simulation, inventory control model and waiting line model.



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2.6.1 Course Outcomes (COs) all courses

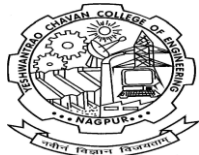
Sem.	Course Code	Course Title	CO	Co Contains
7 th SEMESTER	ME- 2423 LAB ME2424	PE 3 - Computer Aided Design and Mfg.	CO 1	Explain the concepts of CAD tools & Evaluate criteria for CAD Systems
			CO 2	Solve 2D and 3D Transformation problems
			CO 3	Utilize parametric equations of wireframe entities and surface entities for finding the coordinates.
			CO 4	Explain concepts of FMS, Group technology. Create a Part Program for given object.
7 th SEMESTER	ME- 2425 LAB ME2426	PE 3 - Vehicle Engineering	CO 1	Classify & Evaluate various systems of Engine, its function including fuel supply, cooling and lubrication system in vehicle.
			CO 2	Analyze and Discuss various power transmission systems from clutch to wheel in vehicle.
			CO 3	Analyze control systems like steering, suspension, and brakes in vehicle.
			CO 4	Analyze and recommend the necessary electrical and luxurious systems and safety system in vehicle..
7 th SEMESTER	ME- 2427 LAB ME2428	PE 3 - Solar Energy and It'S Utilisation	CO 1	Interpret the Solar geometry and Evaluate the data from measuring instruments.
			CO 2	Classify Analyze and Discuss Solar Collectors.
			CO 3	Evaluate the performance of solar thermal systems
			CO 4	Design and Develop the solar storage system.
7 th SEMESTER	ME- 2433 LAB ME2434	PE 3 - Pipe Design Engineering	CO 1	Describe the basic concepts of Piping design and Engineering
			CO 2	Apply the basic concepts involved in selection of components and equipment in piping design.
			CO 3	Apply the knowledge of design and engineering for preparation of process diagram and piping diagram
			CO 4	Analyze the application of international standards for piping design
7 th SEMESTER	ME- 2435 LAB ME2436	PE 3 - Earth Moving Equipments	CO 1	Summarize the knowledge in Earth Moving Equipments and its Mechanical components
			CO 2	Summarize the knowledge in basic Hydraulic hardware system components used in Earth Moving Equipments..
			CO 3	Summarize the knowledge in Electrical and Electronic system used in Earth Moving Equipments.
			CO 4	Analyze and Evaluate the problems in Earth Moving Equipments systems and provide solution.
7 th SEMESTER	ME- 2444	PE 4 -Engineering of Plastics	CO 1	Will be able to IDENTIFY of preparation and properties of polymers
			CO 2	Will be able to Understand and apply the various molding techniques and also Generalize the basic concepts in mould design
			CO 3	Will be able to Understand and apply suitable machining and joining of plastic materials.
			CO 4	Will be able to Understand and apply suitable for plastic composite fabrication technique
7 th SEMESTER	ME- 2447	PE 4 - Maintenance Management	CO 1	Demonstrate the maintenance function, its importance, types and organize the maintenance department and reliability concepts
			CO 2	Analyze the failure of a machine and plan the condition monitoring program for a machine
			CO 3	Calculate repair and maintenance cost and evaluate maintenance performance
			CO 4	Interpret maintenance needs of basic electrical and mechanical devices
7 th SEMESTER	ME- 2449	PE 4 - Project Evaluation & Management	CO 1	Examine and screen project ideas
			CO 2	Analyze the Technical and Economical feasibility of the project
			CO 3	Design and analyze the project and prepare project report
			CO 4	Evaluate the project on Economical, Social and Environmental aspects.



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Sem.	Course Code	Course Title	CO	Co Contains
7 th SEMESTER	ME- 2462	PE 5 - Product Design and Development	CO 1	Explain the product life cycle and technology development cycle.
			CO 2	Evaluate to select the best suitable material and thereon manufacturing process for the designed product.
			CO 3	Evaluate the product for different design criteria like Value engineering/ analysis, robust design, benchmarking, DFX, etc and estimate the product costing.
			CO 4	Explain the various prototyping methods and their economics
7 th SEMESTER	ME- 2463	PE 5 - Power Plant Engineering	CO 1	Apply the knowledge of thermodynamic law and Analyze the various systems of thermal power plant.
			CO 2	Analyze and Estimate parameters of the hydraulic power plants
			CO 3	Assess the economics of power plants, Inspect the factors affecting the power plants load and Evaluate economic condition of power generations systems.
			CO 4	Understand and Analyze nuclear power plant and discuss safety aspect
7 th SEMESTER	ME- 2464	PE 5 - Value Engineering	CO 1	Students will be able to explain the various types of Values and functions
			CO 2	Students will be able to evaluate the product life cycle
			CO 3	Students will be able to analyze the project selection and estimate life cycle costs
			CO 4	Students will be able to evaluate and improve value of product/system by designing and critically analysing the VE job plans and other VE/VA techniques
7 th SEMESTER	ME- 2465	PE 5 - Design of Exp. and Taguchi Methods	CO 1	Apply the knowledge of Frequency Distribution and Analyze the data by using Histograms and Probability distribution
			CO 2	Evaluate the Design of experiments for Engineering Process
			CO 3	Distinguish and Analyze the different optimization techniques.
			CO 4	Analyze the variance in observation data.
7 th SEMESTER	ME- 2466	PE 5 - Industrial Safety	CO 1	Explain the need and importance of Occupational safety
			CO 2	Illustrate the risk management
			CO 3	Apply remedial measures to handle the accidental situation in plant
			CO 4	Illustrate the Safety. training and awareness among employees.
7 th SEMESTER	ME- 2468	PE 5 - Tribology	CO 1	Establish Economical benefits, social utility and areas of utilization of tribological concept and associated problem.
			CO 2	Articulate the detailed operation of Tribological components and their utility in engineering industry.
			CO 3	Evaluate concept of friction, lubrication, and wear processes and its utility in designing tribological components.
			CO 4	Analyze and select energy efficient tribological system for optimal performance



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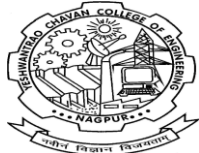
Sem.	Course Code	Course Title	CO	Co Contains
7 th SEMESTER	ME- 2409	Mini Project	CO 1	Plan (L5) and accomplish (L6) an innovative engineering mini-project, within given constraints, using knowledge and skills developed during the course.
			CO 2	Investigate (L6) a complex problem by formulating (L6) a research question, appraising current literature and developments, and applying (L3) research principles/ methods to produce (L6) scientific content in the form of technical report, thesis, publications, posters and patents.
			CO 3	Apply (L3) technological tools/methods/ software effectively to design (L6)/ formulate and conduct(L6) experiments and then Correlate (L4) the theoretical and experimental/simulations results and draw (L3) the proper inferences to come out with concrete solutions.
			CO 4	Develop (L6) conceptual and engineering design/ formulation of any process/mechanical components/ system and also to fabricate/ simulate/operate them applying (L3) different technical skills, engineering tools /management principles/ processes/ application software effectively within technical, budgetary, risk, ethical, societal and time constraints.
			CO 5	Apply (L3) problem-solving methodologies to generate (L6), evaluate (L5) and justify (L4) innovative solutions
			CO 6	Reflect (L5) on professional engineering practice, management principles and its impact on the project, including safety, ethical, legal, social, cultural and sustainability considerations, along with knowledge of contemporary issues
			CO 7	Demonstrate (L3) professionalism, integrity, ethical conduct and professional accountability in all aspects of project work, including teamwork and multidisciplinary approach.
			CO 8	Demonstrate (L3) effective professional written and oral communication to a variety of audiences through proposals, reports, documentation and presentations.
			CO 9	Justify (L5) the need for lifelong learning activities to cope up with technological changes.
4th	GE-2204	Advance Mathematical Techniques	CO 1	Apply numerical techniques to obtain approximate solutions of mathematical equations.
			CO 2	Formulate LPP in Mathematical form and determine the optimal solution of linear programming problems.
			CO 3	Determine the Statistical parameters for random variables.
			CO 4	Explain the basic concept of fuzzy sets, Relations and fuzzy logic.
4th	ME 2251	DESIGN OF MACHINE ELEMENTS	CO 1	Apply knowledge of design principal in various machine components.
			CO 2	Analyze the design process of various joints i.e., Welded joints, Bolted joints and Riveted joints.
			CO 3	Evaluate the design and failure criteria of power screw, springs, clutches and brakes.
			CO 4	Analyze the design process of pressure vessel, power transmission shafts and finding its failure criteria.
4th	ME 2252	Heat Trasfer	CO 1	Evaluate the energy interaction in various processes by applying the laws of thermodynamics while analyzing various thermodynamic systems.
			CO 2	Evaluate the performance of cyclic devices and change in the entropy while analyzing various processes applying the laws of thermodynamics.
			CO 3	Evaluate various thermodynamic parameters while analyzing thermodynamic processes with phase change using phase change diagrams, relations and steam tables.
			CO 4	Analyze the performance of various Thermodynamic cycles applying Law of thermodynamics for evaluation of energy interaction.



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2.6.1 Course Outcomes (COs) all courses

Sem.	Course Code	Course Title	CO	Co Contains
4th	ME 2254 / LAB ME2254	MANUFACTURING PROCESSES/ Lab : MANUFACTURING PROCESSES	CO 1	The student will be able to illustrate the basics of moulding process and compare various casting processes
			CO 2	The student will be able to analyze various Forming and sheet metal working processes
			CO 3	The student will be able to Distinguish and classify different welding processes.
			CO 4	The student will be able to discuss and describe unconventional machining processes.
4th	ME 2256 / LAB ME2257	Production Management	CO 1	Illustrate the basic knowledge of measuring instruments and Analyze various characteristics Static & Dynamic.
			CO 2	Describe principles of metrology and Analyze quality by metrological instruments.
			CO 3	Illustrate the basic knowledge of limits-fit, Tolerances and Design of limit gauges, tolerance charts.
			CO 4	Evaluate quality improvement through statistical tools and acceptance sampling techniques improvement.
6th	ME2351	Fluid Machine	CO 1	Analyze and Evaluate the working parameters of Positive Displacement Pumps
			CO 2	Analyze and Evaluate the working parameters of Centrifugal Pumps.
			CO 3	Examine, Analyze and Discuss the properties of compressible flow.
			CO 4	Analyze and Evaluate the working parameters of air compressors.
6th	ME2353	Design of Mechanical Drives	CO 1	Describe the design process, material selection & calculations of stresses in flat belt, V belt, chain drive and rope drive, and finding its failure criteria. (II & III Level)
			CO 2	Design the various gear drive such as spur, helical, worm & worm wheel and bevel gears, and finding its failure criteria. (VI Level)
			CO 3	Summarize the knowledge on shafts, coupling and flywheel and & calculate its failure criteria. (II & III Level)
			CO 4	Evaluate the radial and thrust load for journal bearings, antifriction bearings and finding its failure criteria. (V Level)
6th	ME2362	FEM	CO 1	Distinguish the fundamentals of Finite Elements Method.
			CO 2	Analyse the mechanical engineering problems.
			CO 3	Evaluate the stresses, strains and deformation in simple machine elements and solutions for simple problems
			CO 4	Evaluate the solutions using the CAE software for simple machine elements.
6th	ME2365	IC ENGINES	CO 1	Understand and analyze basic construction and working cycles of I.C. Engines
			CO 2	Analyze fuels, combustion process, pollution and its control and evaluating of I.C. engine fuels
			CO 3	Examine and analyze C. I. Engines and S. I. Engine.
			CO 4	Analyze Engine performance of I C engine and evaluate by Heat balance sheet calculation
6th	ME2367 / 2368	REFRIGERATION AND CRYOGENICS / Lab : REFRIGERATION	CO 1	Interpret and Analyze the Air Cycle Refrigeration Systems.
			CO 2	Design and analyze the Vapour Compression Refrigeration System and interpret the properties of refrigerant.
			CO 3	Interpret and analyze a various vapour absorption system.
			CO 4	Interpret and analyze low temperature Cryogenic system.
6th	ME2369 / LAB 2370	CIM	CO 1	Design and evaluate programs on CNC machines.
			CO 2	Designing of GT cell layouts for transforming into flexible manufacturing system.
			CO 3	Compose and apply robot programs various industrial applications.
			CO 4	Justify the role of CAPP and CAQC in computer integrated manufacturing



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2.6.1 Course Outcomes (COs) all courses

Sem.	Course Code	Course Title	CO	Co Contains
6th	ME2371 / LAB 2372	MECHATRONICS	CO 1	Analyze and model various mechatronic systems.
			CO 2	Analyze and select the Electric motors for development of mechatronic systems.
			CO 3	Analyze the characteristics and use various IC's. along with internal hardware structure in Mechatronics Systems.
			CO 4	Analyze the working of various integrated Systems and concept of machine intelligence.
6th	ME2377/ ME2378	INDUSTRIAL FLUID POWER	CO 1	To apply the fluid power laws and principals for analysis of simple fluid power systems and fluids.
			CO 2	To identify, analyze, and justify selection of suitable components of fluid power system for specific applications based on its function, performance and working characteristics.
			CO 3	To design and examine the fluid power system and to compose and interpret its circuit diagrams using standard symbols.
			CO 4	To examine the safety measures, maintenance and troubleshooting for fluid power systems.
6th	ME2387/ ME2388	Advance Welding Techniques / Lab : Advance Welding Techniques	CO 1	Discuss the concept of advance welding processes Apply to industry applications.
			CO 2	Identify the parameters needed for welding and Apply to increase the durability of product.
			CO 3	Apply the concept of soldering and brazing and cutting process through welding in Industrial applications. (L3)
			CO 4	Evaluate welding defect through welding testing method.
8th	ME2432	Project Phase II	CO 1	Plan (L5) and accomplish (L6) an innovative engineering mini-project, within given constraints, using knowledge and skills developed during the course.
			CO 2	Investigate (L6) a complex problem by formulating (L6) a research question, appraising current literature and developments, and applying (L3) research principles/ methods to produce (L6) scientific content in the form of technical report, thesis, publications, posters and patents.
			CO 3	Apply (L3) technological tools/methods/ software effectively to design (L6)/ formulate and conduct(L6) experiments and then Correlate (L4) the theoretical and experimental/simulations results and draw (L3) the proper inferences to come out with concrete solutions.
			CO 4	Develop (L6) conceptual and engineering design/ formulation of any process/mechanical components/ system and also to fabricate/ simulate/operate them applying (L3) different technical skills, engineering tools /management principles/ processes/ application software effectively within technical, budgetary, risk, ethical, societal and time constraints.
			CO 5	Apply (L3) problem-solving methodologies to generate (L6), evaluate (L5) and justify (L4) innovative solutions
			CO 6	Reflect (L5) on professional engineering practice, management principles and its impact on the project, including safety, ethical, legal, social, cultural and sustainability considerations, along with knowledge of contemporary issues
			CO 7	Demonstrate (L3) professionalism, integrity, ethical conduct and professional accountability in all aspects of project work, including teamwork and multidisciplinary approach.
			CO 8	Demonstrate (L3) effective professional written and oral communication to a variety of audiences through proposals, reports, documentation and presentations.
			CO 9	Justify (L5) the need for lifelong learning activities to cope up with technological changes.

Electrical Engineering

Yeshwantrao Chavan College of Engineering, Nagpur
 PO/PSO and CO's of all courses of the UG Programme
 Name of the Department: Electrical Engineering
 Name of the UG Programme: B.E. in Electrical Engineering
 Session 2021-22
 COURSE OUTCOMES SESSION 2021-2022

Second Year: Semester I/II:

Bloom's Level	Course Name: Electrical Engineering (T/P) Course Code: EL2101/EL2102
L1	CO1 Reproduce fundamentals of dc circuits, single phase, and three phase ac circuits.
L4	CO2 Analyse dc circuits, single phase and three phase ac circuits for basic electrical quantities such as current, voltage, power etc.
L2	CO3 Explain construction, working, testing, and applications of various electrical machines.
L4	CO4 Analyse performance of various electrical machines.
L4	CO5 Perform laboratory experiments and demonstrate competency in collecting, interpreting, analysing data, communicate and

Second Year: Semester III:

Bloom's Level	Course Name: Engineering Mathematics III (T) Course Code: GE2201
	CO1 Estimate the Calculus of Numerical Function.
	CO2 Determine the transforms and inverse transforms of various functions of variables and use it to solve Mathematical equations.
	CO3 Discuss the nature of periodic function and express it in terms of series.
	CO4 Use appropriate method/s to solve partial differential equations.

Bloom's Level	Course Name: Analog Electronics (T) Course Code: EL2201
L2	CO1 To describe basic analog electronics circuits using various semiconductor devices such as BJT & Op-amp.
L4	CO2 To analyse Power Amplifier and Oscillator Circuits using BJT
L6	CO3 To Design Various Amplifier circuits using BJT and Op-amp
L3	CO4 To illustrate different circuits using Op-amp for various application

Bloom's Level	Course Name: Electronics Engineering Workshop (P) Course Code: EL2202
L2,L3,L5	CO1 Explain the basics of electronic hardware system and to identify the active and passive electronic components.
L3,L6	CO2 Build hands-on training with familiarization, identification, testing, assembling, and dismantling of various components like
L6	CO3 Design various systems and develop PCB fabrication skills making use of the various tools and instruments available in the
L3	CO4 Make use of Software skills for designing PCB using various tools available in the Electronics Engineering Workshop.

Bloom's Level	Course Name: Electrical Machines (T/P) Course Code: EL2203/EL2204
L3	CO1 Apply the basic fundamentals of Electromagnetism.
L4	CO2 Analyze the performance of Transformers.
L4	CO3 Illustrate proficiency in understanding the performance of D.C. Machines.
L4	CO4 Evaluate the performance of Induction Motors.

Bloom's Level	Course Name: Network Analysis (T) Course Code: EL2205
L4	CO1 Identify, apply and analyze electric circuits using conventional tools.
L4,L6	CO2 Analyze and design electric circuits using network theorems.
L4	CO3 Evaluate the initial and final values of current and voltage of electric circuits containing energy storage elements.
L4,L6	CO4 Analyze and design electrical circuits using Laplace transform.

Bloom's Level	Course Name: Computer Programming (P) Course Code: EL2206
L2	CO1 Explain various programming constructs of SCILAB
L3	CO2 Develop programs using numerical techniques and circuit analysis learned
L4	CO3 Analyse and plot the results

Bloom's Level	Course Name: Electrical Measurement & Instrumentation (T/P) Course Code: EL2207/EL2208
L2	CO1 Discuss the working principle of measuring instruments and circuit parameters
L3	CO2 Explain the concepts of measurement of power and Energy.
L2	CO3 Illustrate the fact and ideas related to instrument transformer
L3	CO4 Apply the knowledge of analog and digital instruments with transducers to measure physical quantities

Second Year: Semester IV:

Bloom's Level	Course Name: Advance Mathematical Techniques (T) Course Code: GE2204
	CO1 Utilize numerical techniques to obtain approximate solutions of mathematical equations

	CO2	Design and determine the solution of linear programming problems.
	CO3	Measure the Statistical parameters for random variables.
	CO4	Explain the basic concept of fuzzy sets, Relations and fuzzy logic.
Bloom's Level		
Course Name: Electrical Machines in Power System (T/P) Course Code: EL2251/EL2252		
L4	CO1	Analyze steady state performance of synchronous machines.
L3	CO2	Illustrate Synchronization, load sharing and effect of variable excitation in parallel operation of alternators.
L4	CO3	Evaluate the performance of Synchronous machine connected to infinite bus.
L2	CO4	Describe the transient behavior of Synchronous Machine.
Bloom's Level		
Course Name: Electrical Energy Generation System (T) Course Code: EL2253		
2	CO1	Classify types of renewable energy sources and different factors associated with a generating station
3	CO2	Explain various parameters related to selection and application of Solar ,Wind Energy and Biogas
4	CO3	Illustrate design parameters for Hydro and Thermal Power generating Systems.
4	CO4	Explain various parameters related to generation of Nuclear Power
Bloom's Level		
Course Name: Renewable Energy System (P) Course Code: EL2254		
L2	CO1	Analyze solar energy for various applications.
L4	CO2	Evaluate wind energy conversion systems and estimate its parameters.
L2	CO3	Understand Biomass energy conversion systems.
Bloom's Level		
Course Name: Electric & Magnetic Fields (T) Course Code: EL2255		
L3	CO1	Apply vector calculus to understand the behavior of static electric fields and static magnetic fields in standard
L3	CO2	Apply the Maxwell's equation relating to the electric and magnetic fields and the applications in electrostatics field.
L4	CO3	To discriminate the symmetrical and unsymmetrical nature of the problem and the ability to solve the problems
L4	CO4	Analyze electromagnetic wave propagation in free-space.
Bloom's Level		
Course Name: Electrical Engineering Workshop (P) Course Code: EL2256		
L1	CO1	Understand basic concept of various electrical components
L2	CO2	Able to explain basic of maintenance and troubleshooting of household equipments, energy saving etc.
L3	CO3	An ability to solve hardware engineering problems.
Bloom's Level		
Course Name: Microprocessor (T/P) Course Code: EL2257/EL2258		
L2	CO1	Explain types of memory devices and architecture of 8085 microprocessor.
L2	CO2	Classify the instructions with the help of Addressing modes of 8085 with necessary programs.
L3	CO3	Apply the knowledge of programming concepts of 8085 for various applications.
L4	CO4	Analyze the architecture of various Interfacing Devices like 8255 PPI, 8253, ADC and DAC and Programming of all the
Bloom's Level		
Course Name: Signals and Systems (T) Course Code: EL2259		
L2	CO1	Classify mathematical representation of signals and systems in various domains.
L3	CO2	Determine signals in time and frequency domain using Fourier series and Fourier transform.
L4	CO3	Analyze the given system in time domain and frequency domain to arrive at valid conclusion.
L4	CO4	Evaluate various parameter using properties of transform techniques to solve the continuous and discrete Time Systems
Third Year: Semester V:		
Bloom's Level		
Course Name: Power Electronics (T/P) Course Code: EL2301/EL2302		
L1	CO1	Identify power semiconductor devices and their use in power converters
L2	CO2	Describe Power semiconductor devices with their turn on/off methods and converter circuits
L3	CO3	Determine the different parameters of commutation, protection of power devices and converter circuits
L4	CO4	Analyse the performance of converters, chopper and inverter
Bloom's Level		
Course Name: Fundamentals of Power System (T) Course Code: EL2303		
2	CO1	Describe basic components of Power System and per unit values of system components
3	CO2	Determine the transmission line parameters.
4	CO3	Explain the types of insulators, underground cables and the performance of system.
4	CO4	Evaluate the performance of distribution and transmission system.
Bloom's Level		
Course Name: Electrical Drives (T/P) Course Code: EL2304/EL2305		
L2	CO1	Explain the speed-torque characteristics ,starting,braking and control of different motors and to select the motor drive for
L3	CO2	Identify the size of motor for suitable drive application and motor torque in flywheel effect.

L4	CO3	Analyze PLC Ladder programming to control electrical drives.
L4	CO4	Categorize analog and digital speed controls for electrical drives.
Bloom's Level		
Course Name: OEI: Renewable Energy Generation System (T) Course Code: EL2311		
L2	CO1	Discuss types of renewable energy sources, outline as per Global and Indian context
L3	CO2	Explain various applications of Solar energy sources and classify types of wind turbine generator
L4	CO3	Classify geothermal and biomass energy
L4	CO4	Compare energy from ocean, tide, wave and hydro for power generation, storage methods for renewable energy sources.
Bloom's Level		
Course Name: OEI: Electrical Machines and their Applications (T) Course Code: EL2312		
1	CO1	Recall the basic working of different electrical machine
2	CO2	Demonstrate the basic of electric drives.
3	CO3	Illustrate the application of different electrical machine
4	CO4	Distinguish the different electrical machine used in drives applications
Bloom's Level		
Course Name: OEI: Testing and Maintenance of Electrical Machines (T) Course Code: EL2313		
L2	CO1	Classify, the causes of hazards, accidents, shock and the remedial action taken against the electrical shock.
L4	CO2	Conclude different types of tests and the various maintenance techniques to be employed on various electrical machines and
L1	CO3	Describe the factors affecting the life of insulation, its testing and maintenance.
L5	CO4	Distinguish the various tests to be conducted on distribution transformer, I. S. Standards.
Bloom's Level		
Course Name: OEII: Electrical Energy Audit and Safety (T) Course Code: EL2321		
L2	CO1	Classify, the consumption pattern, conservation of electrical energy and Electricity Act 2001.
L2	CO2	Demonstrate different forms of energy to optimize the use for maximizing the efficiency of system.
L4	CO3	Examine the proper utilization of energy by energy management and audit.
L4	CO4	Analyze the various Global Environmental Concerns and Electrical safety procedures.
Bloom's Level		
Course Name: OEII: Utilization of Electrical Energy (T) Course Code: EL2322		
L3	CO1	Utilize the concept of electrical engineering for the purpose of heating, welding and illumination.
L2	CO2	Explain the concept of cooling and heating and apply the principle for refrigeration and air condition operation.
L3	CO3	Identify the components of electric traction system and driving cycles.
L3	CO4	Make use of characteristics of generation system and optimum power flow.
Bloom's Level		
Course Name: OEII: Power System Engineering (T) Course Code: EL2323		
L1	CO1	Articulate types of load and power system concepts required to engineering problems.
L2	CO2	Develop the ability to implement the appropriate safety equipment for design of electrical power system with enhancing the
L2	CO3	Formulate A.C and D.C distribution networks for necessary variable calculation.
L3	CO4	Ability to design and analyze switchgear protection system with respect to various electrical parameters which is required in
Third Year: Semester VI:		
Bloom's Level		
Course Name: Fundamentals of Management (T) Course Code: GE2311		
	CO1	Explain the Legal provision and Functions of Management.
	CO2	Analyze the role of Human Resource and Financial Management in the organization.
	CO3	Analyze the project life cycles.
	CO4	Identify tools and techniques for the marketing of goods and services.
Bloom's Level		
Course Name: Control System (T/P) Course Code: EL2351/EL2352		
2	CO1	Classify control systems, transfer function of the system with electrical and Mechanical systems
3	CO2	Illustrate the time response of the system
4	CO3	Analyze stability using transfer function and state variable approach.
5	CO4	Estimate parameters using root locus and frequency domain methods.
Bloom's Level		
Course Name: Power System Analysis (T) Course Code: EL2353		
3	CO1	Apply symmetrical components concepts in fault analysis
4	CO2	Analyse different faults in power system
4	CO3	Evaluate stability and economic operation of power system
2	CO4	Differentiate different neutral grounding and compensation systems
Bloom's Level		
Course Name: Simulation of Power Electronics & Power System (P) Course Code: EL2354		
L3	CO1	SIMULATE THE VARIOUS POWER PROCESSING CIRCUITS SUCH AS CONVERTERS, DC/DC REGULATORS AND INVERTERS

L3	CO2	DEVELOP SIMULATION circuit to quantify the performance of short, medium and long transmission lines.
L4	CO3	ANALYSE the performance of processing circuits and transmission line
Bloom's Level Course Name: Substation Design (P) Course Code: EL2355		
2	CO1	Explain single line diagram of substation with rating of different equipments, types of relays required and their settings
3	CO2	Illustrate plan of equipments and panels mounted in a substation.
4	CO3	Analyze earthing system of substation.
6	CO4	Design of substation complete in regards to selection of equipments, sizes, protective schemes and earthing system
Bloom's Level Course Name: PEI: Advanced Power Electronics (T) Course Code: EL2361		
	CO1	Identify and recall various power semiconductor devices and their effects produced in electrical system
	CO2	Explain and compare various power electronic converters and inverters used for various applications
	CO3	Apply knowledge of modulation techniques to various converters
	CO4	Demonstrate knowledge related to effects of harmonics, their measurement and elimination from the system
Bloom's Level Course Name: PEI: Electrical Distribution in Power System (T) Course Code: EL2362		
L2	CO1	Illustrate various components in distribution System network.
L3	CO2	Calculate voltage drop, reactive power compensation, power loss, fault current for distribution network.
L5	CO3	Recommend substation type, earthing methods and tariff structures.
L5	CO4	Consider distribution systems for distribution automation and SCADA.
Bloom's Level Course Name: PEI: Illumination Engineering (MOOC) (T) Course Code: EL2363		
L2	CO1	Identify the criteria for the selection of lamps and lighting systems for an indoor or outdoor space
L3	CO2	Explain the different parameters in designing an illumination system for a particular application.
L3	CO3	Apply different illumination systems for different applications.
L4	CO4	Devise proper illumination model for a specific application.
Bloom's Level Course Name: PEI: Electric Vehicles (T) Course Code: EL2364		
3	CO1	Apply the concept of dynamics to size the electric powertrain
2	CO2	Identify the different energy and power sources and utilize their characteristics for Electric Vehicles
4	CO3	Analyze the speed torque characteristics of traction motors and their operation
3	CO4	Illustrate the HEV architecture, powertrain, sizing and their operation
Bloom's Level Course Name: PEI: Electric Power Utilization (T) Course Code: EL2365		
2	CO1	Identify utilization of electrical power with respect to heating and welding
2	CO2	Illustrate illumination from technical point of view
3	CO3	Explain different refrigeration systems for various application
4	CO4	Evaluate various types of fans, pumps, compressor and dg sets along with their
Bloom's Level Course Name: OEIII: Renewable Energy Generation System (T)		
L2	CO1	Discuss types of renewable energy sources, outline as per Global and Indian context
L3	CO2	Explain various applications of Solar energy sources and classify types of wind turbine generator
L4	CO3	Classify geothermal and biomass energy
L4	CO4	Compare energy from ocean, tide, wave and hydro for power generation, storage methods for renewable energy sources.
Bloom's Level Course Name: OEIII: Electrical Machines and their Applications (T) Course Code: EL2372		
1	CO1	Recall the basic working of different electrical machine
2	CO2	Demonstrate the basic of electric drives.
3	CO3	Illustrate the application of different electrical machine
4	CO4	Distinguish the different electrical machine used in drives applications
Bloom's Level Course Name: OEIII: Testing and Maintenance of Electrical Machines (T) Course Code: EL2373		
L2	CO1	Classify, the causes of hazards, accidents, shock and the remedial action taken against the electrical shock.
L4	CO2	Conclude different types of tests and the various maintenance techniques to be employed on various electrical machines and
L1	CO3	Describe the factors affecting the life of insulation, its testing and maintenance.
L5	CO4	Distinguish the various tests to be conducted on distribution transformer, I. S. Standards.
Bloom's Level Course Name: OEIV: Electrical Energy Audit and Safety (T) Course Code: EL2381		
L2	CO1	Classify, the consumption pattern, conservation of electrical energy and Electricity Act 2001.
L2	CO2	Demonstrate different forms of energy to optimize the use for maximizing the efficiency of system.
L4	CO3	Examine the proper utilization of energy by energy management and audit.

L4	CO4	Analyze the various Global Environmental Concerns and Electrical safety procedures.
Bloom's Level		
Course Name: OEIV: Utilization of Electrical Energy (T) Course Code: EL2382		
L3	CO1	Utilize the concept of electrical engineering for the purpose of heating, welding and illumination.
L2	CO2	Explain the concept of cooling and heating and apply the principle for refrigeration and air condition operation.
L3	CO3	Identify the components of electric traction system and driving cycles.
L3	CO4	Make use of characteristics of generation system and optimum power flow.
Bloom's Level		
Course Name: OEIV: Power System Engineering (T) Course Code: EL2383		
L1	CO1	Articulate types of load and power system concepts required to engineering problems.
L2	CO2	Develop the ability to implement the appropriate safety equipment for design of electrical power system with enhancing the
L2	CO3	Formulate A.C and D.C distribution networks for necessary variable calculation.
L3	CO4	Ability to design and analyze switchgear protection system with respect to various electrical parameters which is required in
Fourth Year: Semester VII:		
Bloom's Level		
Course Name: High Voltage Engineering (T/P) Course Code: EL2403/EL2404		
2	CO1	Explain various breakdown mechanism and overvoltages
3	CO2	Determine propagation of travelling waves along with insulation coordination
4	CO3	Analyse generation and measurement of high voltage and current.
4	CO4	Illustrate Non-destructive and high voltage testing of electrical apparatus
Bloom's Level		
Course Name: Computer Applications in Electrical Engineering (T) Course Code: EL1403/EL1404 EL2433		
3	CO1	Build and construct different types of Matrices using graph theory, Apply different methods to Build & Develop the A, B, C, K,
3	CO2	Make use of different methods and Analyze Load Flow studies
5	CO3	Determine the fault current and voltages for different types of faults by using Zbus
3	CO4	Make use of different methods for Transient Stability Studies
Bloom's Level		
Course Name: PE II: FACTS Devices (T) Course Code: EL1410		
	CO1	Understand FACTS Concept, various FACTS Controllers, its classification and explain its applications in Transmission system.
	CO2	Apply different shunt and series compensators and its control schemes
	CO3	Analyze voltage and phase angle regulators in power system
	CO4	Analyse the FACTS concept using combine series-shunt and series-series controller to evaluate the improved transmission
Bloom's Level		
Course Name: PE II: Artificial Intelligence based Systems (T) Course Code: EL1427		
1	CO1	Recall, explain, solve and analyse the principles of fuzzy logic and control.
2	CO2	Explain and discuss adaptive fuzzy control.
3	CO3	Explain, analyse and solve problems in basic neural networks and associative memories
4	CO4	Explain, analyse and solve problems on recurrent networks and neural control.
Bloom's Level		
Course Name: PE II: Advanced Control System (T) Course Code: EL1431		
L6	CO1	Design lag and lead compensator and PI, PD and PID control in time domain and frequency domain
L5	CO2	Determine state variable matrix with solution of state models and concepts of controllability, observability and state variable
L4	CO3	Analyze non-Linear Control System, types of non-linearities, its characteristics and method for stability analysis.
L4	CO4	Explain sample data control system, Stability analysis with Z-transforms and solution of discrete time systems.
Bloom's Level		
Course Name: Electrical Distribution Power System (T) Course Code: EL1432		
L2	CO1	Illustrate various components in distribution System network.
L3	CO2	Calculate voltage drop, reactive power compensation, power loss, fault current for distribution network.
L5	CO3	Recommend substation type, earthing methods and tariff structures.
L5	CO4	Consider distribution systems for distribution automation and SCADA.
Bloom's Level		
Course Name: Simulations in Power System (P) Course Code: EL1405		
L1	CO1	DESCRIBE knowledge of simulation tool such as MATLAB for application of Power System
L3	CO2	DEVELOP SIMULATION circuit to quantify the performance of short, medium and long transmission lines.
Bloom's Level		
Course Name: Industrial Training / CRT (T) Course Code: EL1406		
L3	CO1	Analytical skill improvement of logical reasoning for professional responsibilities.
L6	CO2	Develop communication, overall personality.

Bloom's Level	Course Name: Mini Project Course Code: EL1407	
L1	CO1	Identify the research area of project work in Electrical Engineering.
L2,L6	CO2	Summarize the literature review in the area identified, propose the objectives of project work.
L3,L4	CO3	Organize requisite components with specifications for the project software/hardware prototype and apply suitable
L2,L5,L6	CO4	Compile project work to prepare a thesis report and present a research paper on project
Bloom's Level	Course name: PE II:Electrical Installtion design(EL2412)	
L2	CO1	Classify the techniques used to identify the load pattern
L2	CO2	Explain various types of wires, cables used in distribution systems and their tests
L3	CO3	Identify different types of luminaries and develop calculation skills.
L4	CO4	Analyze various components involved in substation and their function.
Bloom's Level	Course name: PEIII: Electrical Energy Audit and Safety Analysis (EL2423) (As per new SoE-2018-19)	
L1	CO1	Describe, the energy sources, methods of energy conservation and its pattern, electricity act 2003
L2	CO2	Interpret different forms of electrical and thermal energy.
L2	CO3	Estimate the Energy Management, Energy Audit, Energy Monitoring and Targeting.
L3	CO4	Determine the various Global Environmental Concerns and Electrical safety procedures.
Bloom's Level	Course name: PE II: Electrical Machine Design EL2413 VII semester	
L2	CO1	Classify various materials used in construction of electrical machines and find their rating and performance
L3	CO2	Determine the design parameters of transformer
L3	CO3	Compute stator, rotor design dimensions of induction motor
L4	CO4	Evaluate the designed parameters of synchronous machine.
Fourth Year: Semester VIII:		
Bloom's Level	Course Name: Switchgear and Protection (T/P) Course Code: EL2401 /EL2402	
2	CO1	Explain the various basic principles of protection system
3	CO2	Apply overcurrent protection Principle
3	CO3	Solve the problems on distance protection.
2	CO4	Explain the types of circuit breaker
5	CO5	Explain the protection used for Equipment's Protection
Bloom's Level	Course Name: Substation Design (P) Course Code: EL1418	
2	CO1	Explain single line diagram of substation with rating of different equipments, types of relays required and their settings
3	CO2	Illustrate plan of equipments and panels mounted in a substation.
4	CO3	Analyze earthing system of substation.
6	CO4	Design of substation complete in regards to selection of equipments, sizes, protective schemes and earthing system
Bloom's Level	Course Name: Renewable Energy Sources (T/P) Course Code: EL1433/EL1434	
	CO1	Summarize, classify types of renewable energy sources, outline as per Global and Indian context.
	CO2	Estimate solar radiation geometry, and categorize types of solar energy collectors.
	CO3	Utilize solar energy for various applications, function of dc-dc converters and Grid converters.
	CO4	Classify, analyze wind energy conversion systems and estimate its parameters.
	CO5	Demonstrate various experimental result of renewable energy sources lab & Compare, formulate and estimate energy from
Bloom's Level	Course Name: PE III: Advanced Electrical Drives (T) Course Code: EL1411 Course Code: EL2431 Course Name: PE IV: Advanced	
L3	CO1	Calculate the converter parameters of bridge and chopper controlled DC drives.
L4	CO2	Analyse the various schemes for Induction motor control and estimate the parameters of converters for Induction motor
L2	CO3	Explain synchronous motor, stepper motor and switched reluctance motor drives.
L2	CO4	compare the various drives used in electrical traction .
Bloom's Level	Course Name: PE III: Power System Operation and Control (T) Course Code: EL2421	
L3	CO1	To calculate various factors & reserve requirement for economic aspects of power system.
L4	CO2	Evaluate optimal unit committment ,load forecasting problem & optimal scheduling of generating unit
L3	CO3	Explain the concept of Single area load frequency control.
L3	CO4	Write various methods of voltage control,reactive power compensation
Bloom's Level	Course Name: PE III : Fundamentals of Power Quality (T) Course Code: EL1435	
L1	CO1	Describe the power quality disturbances, causes, effects and their solutions.
L2	CO2	Interpret the various types of the voltage sags.
L3	CO3	Determine the voltage sag magnitude and the impact of the harmonics on supply quality.

L4	CO4	Plan the suitable solution such as filters and custom power devices etc. to mitigate or eliminate the power quality problems.
Bloom's Level		
Course Name: PE IV: EHVAC-HVDC Transmission (T) Course Code: EL1424		
L4	CO1	Analyse Power handling capacity of EHVAC Transmission systems.
L2	CO2	Explain Corona, the concept of Electrostatic and electromagnetics, Electrical safety.
L2	CO3	Classify HVDC Transmission system , Analyse the methods of HVDC Control.
L6	CO4	Design of Harmonic filters and reactive power configuration, HVDC Circuit breaker and Types and applications.
Bloom's Level		
Course Name: PE IV: Electrical Power Utilization (T) Course Code: EL1425		
2	CO1	Identify utilization of electrical power with respect to heating and welding
2	CO2	Illustrate illumination from technical point of view
3	CO3	Explain different refrigeration systems for various application
4	CO4	Evaluate various types of fans, pumps, compressor and dg sets along with their
Bloom's Level		
Course Name: PE IV: Fundamentals of Smart Grid (T) Course Code: EL1436/EL2432		
L2	CO1	To illustrate difference between conventional and smart grid, key functions of smart grid and role of stake holders
L2	CO2	To identify components and computational tools for smooth functioning of smart grid.
L3	CO3	To determine the performance of smart grid based on congestion, security and contingency studies for optimal solutions.
L4	CO4	To discuss designing options of smart grid with options like automation, sustainable energy and storage.
Bloom's Level		
Course Name: PE IV: Electric Vehicles (T) Course Code: EL1437		
3	CO1	Apply the concept of dynamics to size the electric powertrain
2	CO2	Identify the different energy and power sources and utilize their characteristics for Electric Vehicles
4	CO3	Analyze the speed torque characteristics of traction motors and their operation
3	CO4	Illustrate the HEV architecture, powertrain, sizing and their operation
Bloom's Level		
Course Name: Major Project Course Code: EL1420		
L1	CO1	Identify the research area of project work in Electrical Engineering.
L2,L6	CO2	Summarize the literature review in the area identified, propose the objectives of project work.
L3,L4	CO3	Organize requisite components with specifications for the project software/hardware prototype and apply suitable
L2,L5,L6	CO4	Compile project work to prepare a thesis report and present a research paper on project

Electronics Engineering

III SEMESTER

GE2201	Engineering Mathematics III
	The student will be able to:
CO-1	Estimate the Calculus of Numerical Function.
CO-2	Determine transforms and inverse transforms of various functions of variables and use it to solve Mathematical equations.
CO-3	Discuss the nature of periodic function and express it in terms of series.
CO-4	Use appropriate method/s to solve partial differential equations.

EE2201/ EE2202	Electronic Devices/ Lab : Electronic Devices
	Students will be able
CO-1	To understand the concepts of Energy Bands, Charge Carriers and various semiconductor devices like diodes and BJT
CO-2	Be familiarized with semiconductor device fabrication processes.
CO-3	To understand various configurations and their characteristics for BJT and MOSFET amplifiers
CO-4	To understand the concepts of Stabilization and operating points of BJT and MOSFET amplifiers
CO-5	To implement transistorised circuits on breadboard, kits and/or using spice software for verification
EE2203	Signals & Systems
	Students will be able to
CO-1	Classify continuous time signals and systems, transformation of independent variable.
CO-2	Analyze Fourier series, Fourier transform representation of continuous-time periodic and aperiodic signals.
CO-3	Determine and evaluate Laplace Transform of continuous time signals.
CO-4	Analyze time & frequency characterization of Signals and Systems & Sampling Theorem
EE2204	Lab : Programming Language
CO-1	To understand syntax and semantics of language
CO-2	To understand and apply the basics of the programming language
CO-3	To understand and apply special language features
CO-4	To develop any application
EE2205/ EE2206	Digital Logic Design/ Lab : Digital Logic Design

	Students will be able to:
CO-1	Simplify combination logic circuits using Boolean algebra and exhibit the methods to solve logical functions using K-map and Quine-Mc-Clauskey methods.
CO-2	Understand and apply the concept of combinational logic circuits in various digital systems.
CO-3	Understand and demonstrate the various codes and illustrate concept of logic family with their characteristics.
CO-4	Understand the working of Flip-flops and its use to design Synchronous counters and Design and demonstrate finite state machines.
EE2207/ EE2208	Network Analysis/ Lab : Network Analysis
	On successful completion of this course, students should be able to:
CO-1	Apply and analyze nodal and mesh analysis on circuits
CO-2	Apply network theorems, initial and final conditions to analyze circuits
CO-3	Understand, apply and analyze circuits in transform domain
CO-4	Apply the concept of two – port networks to find different two-port parameters.
CO-5	Students will be able to analysis network concepts using EDA Tool.

IV Semester

GE2204	Advanced Mathematical Techniques
	Students will be able to
CO-1	Utilize numerical techniques to obtain approximate solutions of mathematical equations
CO-2	Measure the Statistical parameters for random variables
CO-3	Explain the basic concept of fuzzy sets, Relations and fuzzy logic.
CO-4	Design and determine the solution of linear programming problems

EE2251 / EE2252	Electronic Circuits /Lab : Electronic Circuits
CO-1	Students will be able to know the low frequency parameters and analysis of BJT, MOSFET and its configuration.

CO-2	Students will be able to know the high frequency parameters and analysis of BJT, MOSFET and its configuration.
CO-3	Students will be able to analyze amplifiers with and without feedback.
CO-4	Students will be able to analyze Power amplifier and Oscillators.
CO-5	To implement transistorised circuits on breadboard, kits and/or using spice software for verification

EE2253/ EE2254	Microcontroller & its Applications / Lab. Microcontroller & its Applications
	A student who completes this course will be able to:
CO-1	Understand & Learn concept of Architecture of 8051 μ c
CO-2	Apply the concept of programming language to interface I/O Devices
CO-3	Establish the serial communication between the I/O Devices.
CO-4	Design Data Acquisition System related to Industries

EE2255/ EE2256	Analog Communication /Lab : Analog Communication
	Students will be able to
CO-1	Demonstrate and analyze various amplitudes, angle modulation techniques.
CO-2	Understand various types of receivers & noise in communication system and investigate noise parameters.
CO-3	Understand pulse modulation & multiplexing techniques.
CO-4	Apply the concept of Radiation & Propagation of waves to design communication system
CO-5	Use of Matlab software to write program & simulate communication systems.

EE2257	Electromagnetic Fields
	After study through lectures and assignments, students will able to:
CO-1	Define and recognize different co-ordinate systems, apply different techniques of vector calculus to understand concepts of electromagnetic field theory.
CO-2	Determine the electromagnetic force exerted on charged particles, current elements, working principle of various electric and magnetic fields.
CO-3	Explain fundamental laws governing electromagnetic fields and evaluate the physical quantities of electromagnetic fields in different media using the fundamental laws.

CO-4	Deduce and justify the concepts of electromagnetic waves, means of transporting energy or information, in the form of radio waves.
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EE2258	Lab: Electronics Workshop
	Students Will able to
CO-1	Identify different Electronics Components.
CO-2	Do mini project to enhance their practical Knowledge.
CO-3	Artwork, printing, Etching & drilling of PCB
CO-4	Work in a teamwork

V Semester

EE2301/ EE2302	Digital Signal Processing / Digital Signal Processing Lab
	On completion of this course, the student will be able to
CO-1	Apply DFT and Z transform for the analysis of signals and systems
CO-2	Construct and optimize structures for the realization of discrete Time system
CO-3	Design of Analog and Digital Filters for given specifications
CO-4	Understand fundamentals and architecture of DSP processor.
CO-5	Simulation and verification of various transform techniques and filter Design

EE2303/ EE2304	Analog Integrated Circuits & Its Applications /Lab: Analog Integrated Circuits & Its Applications
	On completion of this course
CO-1	Student will acquire knowledge of the fundamentals, the different Parameters and internal structure of the operational amplifier.
CO-2	Student will analyze and design the linear applications of the operational amplifier.
CO-3	Students will analyze and design active Butterworth filters using operational amplifier
CO-4	Student will analyze and design the non-linear applications of the operational amplifier
CO-5	Students will implement op-amp circuits on breadboard and using spice software for verification.

EE2311/ EE2312	PE I: Computer Communication Network / Lab: PE I: Computer Communication Network
	On completion of this course, Students will be able

	to
CO-1	Understand and explain the concept of Data Communication and networks, layered architecture and their applications, transmission Media, Media Access Control Wireless LAN, Network Connecting Devices in Computer Networks
CO-2	Demonstrate Data Link Layer Protocols, Routing Algorithms, congestion Control, TCP/IP protocol, IP addressing
CO-3	Describe design application layer protocols and internet applications such as Electronic Mail, and File Transfer, WWW and HTTP and DNS
CO-4	Explain Cryptography, Digital Signature, Entity Authentication, FIREWALLS, SSL Services
CO-5	Simulation

EE2313/ EE2314	– PE I: Embedded Systems / Lab: PE I: Embedded Systems
	On completion of this course, Students will be able to
CO-1	Understand & Learn concept of Architecture & organization of ARM.
CO-2	Understand & Learn concept of RTOS Architecture.
CO-3	Apply the concept of programming language to interface I/O Devices.
CO-4	Establish the communication between the different Devices

EE2315/ EE2316	PE I: Algorithm & Data Structure / Lab: PE I: Algorithm & Data Structure
	On completion of this course, Students will be able to
CO-1	Study the trade off method Demonstrate and analyze various techniques.
CO-2	Demonstrate various operation on data Structure
CO-3	Understand various types Data Structure
CO-4	Implement various types algorithm and analyze performance of system.

EE2317/ EE2318	PE I: Applied Machine Learning/ Lab: PE I: Applied Machine Learning
	On completion of this course, Students will be able to
CO-1	Develop an appreciation for what is involved in learning from data, machine learning techniques that are suitable for the different applications
CO-2	Design an appropriate learning model from set of samples to meet the desired needs
CO-3	Compare different machine learning techniques and

	demonstrate the comprehension of the trade-offs involved in design choices
CO-4	Integrate machine learning algorithms with ensemble methods and explain modern technologies like deep and shallow learning

EE2331	OE I: Fuzzy Logic & Neural Network
	On completion of this course, Students will be able to
CO-1	Understand and learn the basic concepts, working principles of various soft computing techniques, especially Fuzzy logic and Artificial Neural Networks.
CO-2	Analyze the problem statements; provide engineering solutions through development of membership functions / membership graphs, Learning & Recognition approaches
CO-3	Work on Case studies based on Application areas of Soft Computing, Design / Develop and Demonstrate models for Fuzzy controllers, Neural Networks
CO-4	Get involved in self learning approach for developing models using Soft computing techniques, Reveal different applications of these models to solve engineering and other problems and develop solutions for problems related to society and industry needs, writing Technical reports, presentations

EE2332	OE I: Basics of Analog and Digital Communication Systems
	On completion of this course, Students will be able to
CO-1	Understand different modulation and demodulation schemes for analog communication with the concept of noise
CO-2	Understand different pulse analog and digital modulation techniques.
CO-3	Understand different digital modulation schemes
CO-4	Understand the different coding techniques for communication systems

EE2333	OE I: Biomedical Instrumentation
	On completion of this course, Students will be able to
CO-1	Describe the basic concepts of biomedical instrumentation and principle of transducer used in biomedical instrumentation
CO-2	Explain cardiovascular, blood pressure measurement and analyze ECG, plethysmograph and spirogram

CO-3	Identify various techniques used in generation and measurement of x-rays, EMG and use of pacemakers, defibrillators in health care.
CO-4	Recognize concept of Telemedicine, its applications and use of internet resource for hospital management system.

EE2341	OE II: Data Acquisition & Signal Conditioning
	After study through lectures and assignments, Students will be able to:
CO-1	Describe the basic model of data acquisition system and the various methods and attributes of signal conditioning
CO-2	Identify the various types of data acquisition hardware and the serial data communication standards.
CO-3	Distinguish different standards for connection of different programmable instruments like GPIB and SCPI
CO-4	Define use of Ethernet, Medium Access control and USB

EE2342	OE II: Microprocessor Programming
	Students
CO-1	Will be able to understand the architecture of 8085.
CO-2	Will demonstrate the ability to identify, Formulate and design Program for an assigned task.
CO-3	Will be able to interface Peripheral devices.
CO-4	Will apply the knowledge of microprocessor in their respective field.

EE2343	OE II: Consumer Electronics
	Students will be able to
CO-1	Understand the knowledge of the safety aspects in the field of Electrical and Electronics products.
CO-2	Analyze the basics of Audio and Video Systems.
CO-3	Know about recent trends in Processors and computer peripherals, mobile and wireless technologies.
CO-4	Understand the basics of refrigeration cycle and cooling system

VI Semester

EE 2351	Control System Engineering
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	Upon successful completion of this course, students should be able to:
CO-1	Understand the use of block diagram and signal flow graph as a modeling tool and the role of feedback in control systems.
CO-2	Understand the response characteristics of basic first- and second-order dynamic systems. Be able to use Routh's criterion for absolute and relative stability analysis.
CO-3	Construct and recognize the properties of root-locus and its role in the analysis of control systems.
CO-4	Obtain frequency response indices. Be able to draw frequency response plots such as polar plot, Bode plot etc.

EE2352	Transmission Lines and Wave Guides
	After the completion of course students will able to
CO-1	Explain fundamental parameters of transmission line and its constraints in high frequency transmission of information.
CO-2	Make use of Transmission line to develop impedance matching networks and any communication system.
CO-3	Relate the propagation characteristics of electromagnetic waves in various wave guide structures.
CO-4	Analyze transmission line using Smith Chart and Design Impedance Matching network.

EE2353/EE2354	Digital Communication/Lab: Digital Communication
CO1	Understand different modulation and demodulation schemes
CO2	Apply the knowledge of signal space representation
CO3	Analyze the coding techniques for communication systems.
CO4	Describe different digital spread spectrum techniques
CO5	Students will able to write program and draw simulink model using Matlab software

EE2361	PE II: Internet of Things EE2362- Lab: PE II: Internet of Things
	Upon successful completion of the course, the student will be able to:

CO-1	Understanding of IoT value chain structure (device, data cloud), application areas and technologies involved
CO-2	Understand IoT sensors and technological challenges faced by IoT devices, with a focus on wireless, energy, power, RF and sensing modules
CO-3	Market forecast for IoT devices with a focus on sensors
CO-4	Explore and learn about Internet of Things with the help of preparing projects designed for Raspberry Pi

EE2363/ EE2364	PE II: Digital CMOS Circuits / Lab: PE II: Digital CMOS Circuits
	A student who completes this course will be able to:
CO-1	Describe and interpret the basic concepts of MOS transistors
CO-2	Construct the ability to design a system, component or process as per needs and specifications.
CO-3	Analyze inverter design, characteristics and applications and performance parameters of CMOS Circuits.
CO-4	Evaluate circuits using different CMOS styles and measure performance of the complex logic structures

EE2365/ EE2366	PE II: Digital Image Processing / Lab: PE II: Digital Image Processing
	Students will be to
CO-1	Understand the basic concepts of digital image processing and digital image geometry.
CO-2	Implement the image enhancement and restoration techniques in spatial and frequency domain.
CO-3	Apply and implement image segmentation techniques using edge detection and merging.
CO-4	Apply different Image processing algorithms

EE2367	PE II: Object Oriented Programming
CO-1	Understand the concept of concepts of Object Oriented Programming.
CO-2	Analyze the using the concept of Inheritance, Polymorphism, Overloading
CO-3	Choose the appropriate data structure and algorithm design method for a specified application.
CO-4	Develop and use linear and non linear data structures and advanced features.

EE2368	Lab: PE II: Object Oriented Programming
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	Students
CO-1	Will learn the basic concepts of Object Oriented Programming.
CO-2	Will design programming the concept of Inheritance, Polymorphism, Overloading
CO-3	Can choose the appropriate data structure and algorithm design method for a specified application.
CO-4	Will be able to use linear and non linear data structures and advanced features of C++ specifically stream I/O, templates and Exception Handling.

EE2381	OE III : Fuzzy Logic & Neural Network
	On completion of this course, Students will be able to
CO-1	Understand and learn the basic concepts, working principles of various soft computing techniques, especially Fuzzy logic and Artificial Neural Networks.
CO-2	Analyze the problem statements; provide engineering solutions through development of membership functions / membership graphs, Learning & Recognition approaches
CO-3	Work on Case studies based on Application areas of Soft Computing, Design / Develop and Demonstrate models for Fuzzy controllers, Neural Networks
CO-4	Get involved in self learning approach for developing models using Soft computing techniques, Reveal different applications of these models to solve engineering and other problems and develop solutions for problems related to society and industry needs, writing Technical reports, presentations.

EE2382	OE III : Basics of Analog and Digital Communication Systems
	Students will be able to
CO-1	Understand different modulation and demodulation schemes for analog communication with the concept of noise
CO-2	Understand different pulse analog and digital modulation techniques.
CO-3	Understand different digital modulation schemes
CO-4	Understand the different coding techniques for communication systems.

EE2383	OE III: Biomedical Instrumentation
	Students will be able to

CO-1	Describe the basic concepts of biomedical instrumentation and principle of transducer used in biomedical instrumentation
CO-2	Explain cardiovascular, blood pressure measurement and analyze ECG, plethysmograph and spirogram
CO-3	Identify various techniques used in generation and measurement of x-rays, EMG and use of pacemakers, defibrillators in health care.
CO-4	Recognize concept of Telemedicine, its applications and use of internet resource for hospital management system.

EE2391	OE IV : Data Acquisition & Signal Conditioning
	After study through lectures and assignments, Students will be able to:
CO-1	Describe the basic model of data acquisition system and the various methods and attributes of signal conditioning
CO-2	Identify the various types of data acquisition hardware and the serial data communication standards.
CO-3	Distinguish different standards for connection of different programmable instruments like GPIB and SCPI
CO-4	Define use of Ethernet, Medium Access control and USB

EE2392	OE IV : Microprocessor Programming
	Students
CO-1	Will be able to understand the architecture of 8085.
CO-2	Will demonstrate the ability to identify, Formulate and design Program for an assigned task.
CO-3	Will be able to interface Peripheral devices.
CO-4	Will apply the knowledge of microprocessor in their respective field.

EE2393	OE IV : Consumer Electronics
	Students will be able to
CO-1	Understand the knowledge of the safety aspects in the field of Electrical and Electronics products.
CO-2	Analyze the basics of Audio and Video Systems.
CO-3	Know about recent trends in Processors and computer peripherals, mobile and wireless technologies.
CO-4	Understand the basics of refrigeration cycle and cooling system.

**7th
Semester**

EE1401/ EE1402	PE II : Embedded System/ PE II : Lab: Embedded System
	Students will
CO-1	Describe the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO-2	Become aware of the architecture of the ARM processor
CO-3	Developed programmed based on ARM architecture.
CO-4	Analyze various examples of embedded systems based on ARM processor.
CO-5	Design real time embedded systems using the concepts of RTOS.
CO-6	Understand different communication protocol.

EE1403/ EE1404	PE II :Digital CMOS circuits/ PE II : Lab. : Digital CMOS Circuits
CO-1	Describe and interpret the basic concepts of MOS transistors, various MOS Process Technologies and design the physical layout of standard and compound Gates
CO-2	Construct the ability to design a system, component or process as per needs and specifications.
CO-3	Analyze inverter design, characteristics and applications and performance parameters of CMOS Circuits.
CO-4	Evaluate circuits using different CMOS styles and measure performance of the complex logic structures
CO-5	To implement combinational circuits using EDA Tool

EE1405/EE1406	PE II : Algorithm & Data Structure/Lab. : Algorithm & Data Structure
	Students will be able to
CO-1	Study the trade off method Demonstrate and analyze various techniques.
CO-2	Demonstrate various operation on data Structure
CO-3	Understand various types Data Structure
CO-4	Implement various types algorithm and analyze performance of system.

EE1407	Electronics Circuit Design
	Student
CO-1	Students will acquire knowledge of Practical Circuit Design.
CO-2	Students will have a fair knowledge of Analysis of circuit Design.
CO-3	Students will understand the Power supplies and their design
CO-4	Students will design for real world applications
CO-5	Students will be able to implement various circuits using simulation

EE1409/EE1410	Digital Communication/Lab: Digital Communication
CO1	Understand different modulation and demodulation schemes
CO2	Apply the knowledge of signal space representation
CO3	Analyze the coding techniques for communication systems.
CO4	Describe different digital spread spectrum techniques
CO5	Students will able to write program and draw simulink model using Matlab software

EE1434	RF & Microwave
CO-1	Analyze the causes of failure of conventional tubes at high frequency and the detail concept of cavity klystron amplifier, Reflex klystron
CO-2	Study modes of operation and different types of magnetron.
CO-3	Study transmission characteristics of Microwave passive Devices (Reciprocal and non reciprocal)
CO-4	Analysis of microwave network.
CO-5	Study of different types microwave measurement techniques.
CO-6	Study of Design of microwave filters by various methods, Microwave solid state devices.

EE1435	Lab. : RF & Microwave
	Students
CO-1	Will understand and gain complete knowledge about characteristics of Reflex Klystron.
CO-2	Will study power distribution in Directional coupler, E & H plane and Magic tee.

CO-3	Will perform frequency measurement.
CO-4	will study the Microwave solid state devices.

EE1412	Project Phase-I
	Students
CO-1	Students will deliver oral presentation, with particular emphasis on the logical organization of relevant content and information, use of appropriate style, pacing and body language, proper handling of questions, and effective time management.(Presentation Skill)
CO-2	Students will demonstrate knowledge of contemporary issues in their chosen field of research.
CO-3	Students will demonstrate the competency to work in team.(Team Work)
CO-4	Students will Critically analyze a selected topic to recognize, formulate and solve problem and apply problem solutions to achieve appropriate practical outcomes.(Literature survey and innovativeness)
CO-5	Students will Competent in team for a project, by participating in competitions.
CO-6	Students will Communicate effectively, using accurate technical and scientific terminology, and demonstrating logical organization of relevant content and information and English language competence(writing Skill)

8th Semester

EE1414	PE III : Computer Communication Network
	Students will be able to
CO-1	Describe various protocols, models in Computer Networks
CO-2	Compare Connectors, Network hardware, Media Types (cables, Wireless)
CO-3	Design, implement and analyze simple computer networks.
CO-4	Apply the different strategies and Operations of TCP/UDP, FTP, HTTP protocols

EE1415	PE III : Operating Systems Concepts
	Students will be able to
CO-1	Understand the concepts of operating systems and processes
CO-2	Learn processes, threads and memory management and storage structures

CO-3	Evaluate the algorithms and solutions for operating system management
CO-4	Analyze the security issues in operating systems

EE1416	PE III : Program in Data Structure and Algorithm using Python
	Students will be able to
CO-1	Demonstrate and analyze various amplitude modulation techniques.
CO-2	Demonstrate and analyze various angle modulation techniques.
CO-3	Understand various types of receivers in communication system.
CO-4	Analyze various types of noise in communication system and investigate noise parameters.

EE1417	PE IV : Soft Computing
	Students
CO-1	Are able to define the concept of fuzziness and compare with crisp logic
CO-2	Can define, describe and analyze uncertainty, unpredictability and vagueness using fuzzy logic concepts.
CO-3	Are able to control process in automated way using fuzzy controllers
CO-4	Are able to compare the concept of Artificial neurons with the biological neurons and define different learning processes.
CO-5	Are able to design and solve pattern recognition and classification problems using different learning methods
CO-6	Are able to evaluate and solve optimization problem using Genetic algorithm.

EE1419	PE IV : Analog VLSI Design
	Student will able to
CO-1	Design small signal model of MOS transistor & understand SPICE Model
CO-2	Perform analysis of single stage amplifiers with or without load.
CO-3	Calculate small signal parameters of differential amplifier.
CO-4	Design current mirrors as bias element.

EE1427 & EE1428	PE IV : Digital Image Processing
	STUDENTS
CO-1	Will learn the basic concepts of image processing, concepts of digital image geometry.
CO-2	Will learn image enhancement techniques in spatial and frequency domain.
CO-3	Will also learn image segmentation.
CO-4	Will also learn image compression and restoration techniques.

EE1423	PE IV : Object Oriented Programming
	Students will be able to
CO-1	Will learn the basic concepts of Object Oriented Programming.
CO-2	Will perform object oriented programming to develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
CO-3	Will design program using the concept of Inheritance, Polymorphism, Overloading
CO-4	Can choose the appropriate data structure and algorithm design method for a specified application.
CO-5	students will be able to use linear and non linear data structures like stacks, queues , linked list etc.
CO-6	Understand advanced features of C++ specifically stream I/O, templates and Exception Handling.

EE1416	PE V: Biomedical Instrumentation& its Applications
	Students
CO-1	Will be able to understand the basic concepts of biomedical instrumentation and principle of transducer used in biomedical instrumentation
CO-2	Will be able to understand cardiovascular, blood pressure measurement and analyze ECG, plethysmograph and spirogram
CO-3	Will be able to understand various techniques used in generation and measurement of x-rays, EMG and use of pacemakers, defibrillators in health care.
CO-4	Will be able to understand concept of Telemedicine, its applications and use of internet resource for hospital management system.
	Average

EE1421	PE V: Optical communication
	Student will be able to

CO-1	Apply the fundamental principles of optics and light wave to design optical fiber communication systems.
CO-2	Differentiate losses in optical fiber link and state transmission characteristics of optical fiber
CO-3	Design optical fiber communication links using appropriate optical fibers light sources, detector
CO-4	Understand the operational principal of WDM, SONET, measurement of attenuation, dispersion, refractive index profile in optical fibers

EE1425	PE V : Wireless Communication
	Students Will be able to
CO-1	Acquire knowledge of evolution of mobile communication.
CO-2	Understand cellular concept in mobile communication system.
CO-3	Differentiate fading technique.
CO-4	Explain need and different methods for enhancing the quality of communication.
CO-5	Classify different system & standard in mobile communication system.
CO-6	Compare wireless network current practice in wireless systems.

EE-1432	Project Phase-II
	Students
CO-1	Students will deliver oral presentation, with particular emphasis on the logical organization of relevant content and information, use of appropriate style, pacing and body language, proper handling of questions, and effective time management.(Presentation Skill)
CO-2	Students will demonstrate knowledge of contemporary issues in their chosen field of research.
CO-3	Students will demonstrate the competency to work in team.(Team Work)
CO-4	Students will Critically analyze a selected topic to recognize, formulate and solve problem and apply problem solutions to achieve appropriate practical outcomes.(Literature survey and innovativeness)
CO-5	Students will Competent in team for a project, by participating in competitions.

EE1436	PE III : RADAR ENGINEERING
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	Students can understand
CO-1	Basic principles of radars.
CO-2	Moving target detection
CO-3	Different kinds of target tracking techniques
CO-4	Radar receiver system
CO-5	Basic radar measurements
CO-6	Radar Transmitter System

EE1437	PE III : MICRO ELECTRO MECHANICAL SYSTEMS
	Students:
CO-1	Will demonstrate the ability to understand working principles of currently available micro sensors, actuators used in Microsystems.
CO-2	Will apply scaling laws that are used extensively in the conceptual design of micro devices and systems.
CO-3	Will understand the basic principles and applications of micro-fabrication processes, such as photolithography, ion implantation, diffusion, oxidation, CVD, PVD, and etching.
CO-4	Will understand RF MEMS components.
CO-5	Will understand Physical Micro sensors
CO-6	Will understand the recent advancements in the field of MEMS and devices

EE1439	PE III : Display Technology
	Gradates will
CO-1	Identify different display technologies and manufacturing processes.
CO-2	Learn practical knowledge of display technologies
CO-3	Analyze properties of Luminescence materials.
CO-4	Explore design parameters for displays and analyze matrix addressing.
CO-5	Comprehend the fundamentals of backlight unit technologies.
CO-6	Be able to design and elaborate applications of displays

EE1438	PE V : Mechatronics
	Students will be introduced to :
CO-1	Mechatronics key elements
CO-2	sensor and transducer
CO-3	Actuating device
CO-4	Signal, system and controls
CO-5	Closed loop controllers: Continuous and discrete process
CO-6	Advanced application in Mechatronics

Electronics Telecommunication Engineering

Yeshwantrao Chavan College of Engineering, Nagpur

Course outcomes of all courses of the UG Programme

Name of the Department: Electronics & Telecommunication Engineering

Name of the UG Programme: B.E. in Electronics & Telecommunication

Second Year: Semester III:

Course Name: : Engineering Mathematics-III		Course Code: GE-2201
CO1	Estimate the Calculus of Numerical Function.	
CO2	Determine the transforms and inverse transforms of various functions of variables and use it to solve Mathematical equations.	
CO3	Discuss the nature of periodic function and express it in terms of series.	
CO4	Use appropriate method/s to solve partial differential equations.	

Course Name: Electronic Devices and Circuits (T/P)		Course Code: ET2201/ ET2202
CO1	Apply the knowledge of semiconductor diodes in circuit analysis	
CO2	Analyze the transistor circuits for different configurations.	
CO3	Design transistor circuit with suitable biasing and stabilization techniques.	
CO4	Analyze the response of transistors at low and high frequency	
CO5	Analyze power amplifier circuits.	

Course Name: Digital Circuits and Fundamentals of Microprocessor (T/P)		Course Code: ET2203/ ET2204
CO1	Illustrate logic families, BCD arithmetic.	
CO2	Simplify the logic functions using various minimization techniques.	
CO3	Design Combinational and sequential logic circuits.	
CO4	Explain the architecture and instructions of 8085	
CO5	Develop 8085 microprocessor programs	

Course Name: Electronic Measurement & Instrumentation (T/P)		Course Code: ET2205/ ET2206
CO1	Elaborate basic measurement and instrumentation system	
CO2	Analyze the types of errors, bridge circuits and gauge factor of strain gauges	
CO3	Explain the working of display devices, generators, and analyzers	
CO4	Measure different physical parameters using suitable transducers	

Course Name: Network Analysis		Course Code: ET2207
CO1	Analyze electrical circuits using nodal and mesh analysis	
CO2	Evaluate electrical circuit parameters using network theorems	
CO3	Estimate steady state and transient response of electrical circuits using initial and final conditions	
CO4	Analyze waveforms using Laplace transform	
CO5	Evaluate parameters of two – port networks.	

Second Year: Semester IV:

Course Name: : Advance Mathematical Techniques		Course Code: GE-2204
CO1	Utilize numerical techniques to obtain approximate solutions of mathematical equations	
CO2	Design and determine the solution of linear programming problems.	
CO3	Measure the Statistical parameters for random variables	
CO4	.Explain the basic concept of fuzzy sets, Relations and fuzzy logic.	

Course Name: Electromagnetic Fields		Course Code: ET2251
CO1	Use appropriate co-ordinate systems for solving electromagnetic fields problems	
CO2	Apply the principles of electrostatics & magneto-statics for the solution of problems relating to electric and magnetic field	
CO3	Analyze static and time varying fields using Maxwell's equations	
CO4	Examine wave propagation in different medium.	

Course Name: Microcontroller and Interfacing (T/P)		Course Code: ET2252 / ET2253
CO1	Elaborate 8051 microcontroller architecture.	
CO2	Develop assembly language program.	
CO3	Develop embedded C language program.	
CO4	Interface 8051 microcontroller to solve real life problems.	

Course Name: Analog Communication (T/P)		Course Code: ET2254 / ET2255
CO1	Analyze different modulation techniques	
CO2	Analyze different parameters of communication receivers.	
CO3	Elaborate the concept of television transmission and reception	
CO4	Estimate noise in communication system	
CO5	Select appropriate techniques for wave propagation of signals.	

Course Name: Control Systems (T/P)		Course Code: ET2256 / ET2257
CO1	Evaluate transfer function of a system	
CO2	Analyze the characteristic of feedback control system	
CO3	Estimate time response of first and second order control systems for different test signals	
CO4	Determine the stability of linear control system	
CO5	Assess frequency domain parameters of linear control system	

Third Year: Semester V:

Course Name: Fundamentals of Economics		Course Code: GE2312
CO1	Recognize consumer's behavior and analyze Market price	
CO2	Extrapolate operations in market with production constraints	
CO3	Describe the national income accounting and public finance.	
CO4	Analyze international trade and institutions.	

Course Name: Analog Integrated Circuits (T/P)		Course Code: ET 2301/ ET 2302
CO1	Design and analyze OP-AMP configurations.	
CO2	Analyze OP-AMP circuit parameters and frequency response	
CO3	Design linear and non- linear OP-AMP applications.	
CO4	Explain special function ICs and design circuits using it	

Course Name: Fields & Radiating Systems		Course Code: ET 2303
CO1	Estimate transmission lines parameters	
CO2	Illustrate parallel plane waveguides, and rectangular waveguides	
CO3	Analyze antenna parameters	
CO4	Explain various types of antennas	

Course Name: Signals & Systems (T/P)		Course Code: ET 2304/ ET 2305
CO1	Classify systems based on their properties and determine the response of LTI system.	
CO2	Analyze system properties based on impulse response and Fourier analysis.	
CO3	Sample and reconstruct the signals.	
CO4	Apply the Laplace transform and Z- transform for analysis of continuous-time and discrete-time signals and systems	

Course Name: Lab: Electronics Workshop(P)		Course Code: ET 2306
CO1	Identify and test passive and active electronic components and devices.	
CO2	Identify and Test wires, cables, connectors and interconnected components.	
CO3	Develop mini project.	

Course Name: OE I/ OE III: Microcontroller & Embedded Systems		Course Code: ET 2311/ET 2381
CO1	Elaborate 8051 microcontroller architecture.	
CO2	Develop assembly language program.	
CO3	Interface 8051 microcontroller with different peripherals	
CO4	Examine Arduino architecture	

Course Name: OE I/ OE III: Principles Of Communication Engineering		Course Code: ET 2312/ET 2382
CO1	Describe analog and digital communication systems and various modulation schemes.	
CO2	Analyze error correcting codes, including block codes.	
CO3	Illustrate multiple access techniques in wired and wireless communication.	

CO4	Discuss the different applications of satellite communication and optical communications
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Course Name: OE I/ OE III: Fundamentals Of Image Processing		Course Code: ET 2313/ET 2383
CO1	Examine the concepts of image enhancement, segmentation, representation and recognition	
CO2	Apply basic image processing algorithms and filtering techniques for image enhancement.	
CO3	Apply the algorithms for image segmentation	
CO4	Apply the techniques for image representation and recognition	

Course Name: OE II/ OE IV: Soft Computing		Course Code: ET 2321/ET 2391
CO1	Examine genetic algorithms, fuzzy logic and neural network techniques	
CO2	Apply genetic operators and genetic algorithms for problem solving	
CO3	Apply Neural Network algorithms in pattern recognition	
CO4	Apply fuzzy logic to solve engineering problems	

Course Name: OE II/ OE IV: Industrial Instrumentation		Course Code: ET 2322/ET 2392
CO1	Explain instrumentation system	
CO2	Analyze pressure, temperature, parameters measured using transducers	
CO3	Analyze flow, speed and level parameters measured using transducers	
CO4	Elaborate automation system components	

Course Name: OE II/ OE IV: Medical Electronics		Course Code: ET 2323/ET 2393
CO1	Elaborate basic physiological systems of human body	
CO2	Explain the physiological parameter measurement techniques.	
CO3	Explain the working of measuring and recording instruments for physiological parameters.	
CO4	Elaborate the working principles of modern imaging systems	

Course Name: OE II/ OE IV: Display Technology & Applications		Course Code: ET 2324/ET 2394
CO1	Identify different display technologies and manufacturing process.	
CO2	Analyze characteristics of display devices and Luminescence materials.	
CO3	Analyze addressing matrix, TFT backplane and backlight unit technologies.	
CO4	Elaborate advanced display devices and Materials	

Course Name: OE II/ OE IV: PLCs and SCADA		Course Code: ET2325 /ET2400
CO1	Explain the basic building blocks of Programmable logic controller	
CO2	Develop PLC and SCADA programs for industrial automation.	

CO3	Illustrate the concepts involved in HMI & SCADA
CO4	Elaborate the concepts in distributed control systems

Third Year: Semester VI:

Course Name: Fundamentals of Management		Course Code: GE2311
CO1	Explain the Legal provision and Functions of Management.	
CO2	Analyze the role of Human Resource and Financial Management in the organization.	
CO3	Analyze the project life cycles.	
CO4	Identify tools and techniques for the marketing of goods and services.	

Course Name: Digital Signal Processing(T/P)		Course Code: ET2351/ ET2352
CO1	Apply discrete Fourier transform and fast Fourier transform on signals.	
CO2	Implement digital filters in a variety of structures.	
CO3	Design digital IIR and FIR filter.	
CO4	Analyze the effects of finite word length on discrete time system	
CO5	Analyze multi-rate discrete time system with unequal sampling rates	

Course Name: PE I : Object Oriented Programming (T/P)		Course Code: ET2361/ ET2362
CO1	Elaborate the object oriented paradigm with concepts of streams, classes, functions, data and objects.	
CO2	Demonstrate the use of various OOPs concepts with the help of C++ programs.	
CO3	Develop C++ programs for implementing data structures using array and linked list.	
CO4	Apply the knowledge of BFS,DFS and Dijkstra`s algorithm for traversal of Graph.	
CO5	Develop C++ programs for implementing the concept of file handling, template and exception handling.	

Course Name: PE I : Discrete Structures (T/P)		Course Code: ET2363/ET2364
CO1	Examine logic and proof concepts.	
CO2	Develop recursive algorithms and recurrence relations.	
CO3	Use concepts of counting methods, and the pigeonhole principle	
CO4	Design applications using graphs, tree, group theory in computer science	
CO5	Apply transport network and pumping network models for problem solving	

Course Name: PE I : Microprocessors and Peripherals (T/P)		Course Code: ET2365/ET2366
CO1	Elaborate architecture and instructions of 8085 and 8086 microprocessor.	
CO2	Analyze timing diagrams and interrupt structure of 8085 microprocessor.	
CO3	Explain functioning of 8255, 8253 and 8257 peripheral ICs	
CO4	Develop programs using 8085 and 8086 instruction sets.	
CO5	Interface various off chip peripherals with 8085.	

Course Name: PE I : Electronic Instrumentation(T/P)		Course Code: ET2367/ET2368
CO1	Explain electronic instrumentation system	
CO2	Analyze pressure, temperature, parameters measured using transducers	
CO3	Analyze flow, speed and level parameters measured using transducers	
CO4	Develop PLC programs by using ladder diagram	

Course Name: PE I : Fundamentals of Computing(T/P)		Course Code: ET2371/ET2372
CO1	Explain Python framework	
CO2	Develop Python programs using data types, operators and control structures	
CO3	Apply strings, lists, tuples, Numpy and dictionaries for Python programs.	
CO4	Develop Python programs using functions	

Course Name: PE I : Algorithms and data structures(T/P)		Course Code: ET2373/ ET2374
CO1	Describe fundamental concepts of Object Oriented Programming	
CO2	Develop C ++ programs to demonstrate the concepts of Object Oriented Programming.	
CO3	Develop programs for implementing data structures.	
CO4	Analyze Skip-list, hashing and search trees.	

Course Name: PE II : Antenna Theory & Design (T/P)		Course Code: ET2377/ ET2378
CO1	Evaluate various parameters of antennas.	
CO2	Analyze performance parameters of various antennas & antenna array	
CO3	Perform of antenna measurements by using different antenna measurement techniques.	
CO4	Design and Analyze various antennas	

Course Name: PE II : Digital System Design (T/P)		Course Code: ET2379/ET2380
CO1	Explain digital system design principles	
CO2	Implement digital circuits using discrete gates and programmable logic devices.	
CO3	Develop Verilog programs for combinational, sequential circuits and test pattern generation.	
CO4	Design a system using CAD tools.	

Course Name: PE II : Internet of Things (IoT) (T/P)		Course Code: ET2381/ET2382
CO1	Illustrate the physical and Logical design of IoT.	
CO2	Explain the M2M and NETCONF.	
CO3	Develop python programs for IoT applications.	
CO4	Design IoT based systems.	

Course Name: PE II : Optical Communication (T/P)		Course Code: ET2383/ET2384
CO1	Elaborate the concepts of optical communication system.	
CO2	Analyze Optical Communication Systems with different types of losses.	
CO3	Select appropriate types of optical fibers and receivers.	
CO4	Elaborate different methods of loss measurements in fiber optics	

Course Name: PE II: Principles of image processing (T/P)		Course Code: ET2385/ET2386
CO1	Examine the concepts of image enhancement, restoration, segmentation, representation and description.	
CO2	Apply basic image processing algorithms and filtering techniques for image enhancement.	
CO3	Apply the algorithms for image restoration and segmentation	
CO4	Extract the features for image representation and description	

Course Name: PE II: TV & Video Engineering (T/P)		Course Code: ET2387/ET2388
CO1	Describe basic concept of monochrome and color TV.	
CO2	Describe and troubleshoot Video Amplifier & luminance circuits.	
CO3	Explain and compare PAL, NTSC and SECAM systems.	
CO4	Explain and compare analog and digital television-transmission and reception.	

Fourth Year: Semester VII:

Course Name: RF & Microwave (T/P)		Course Code: ET 2401/ ET 2402
CO1	Analyze the behavior of linear beam and cross field tubes.	
CO2	Apply s-parameters to model and analyze output response of microwave transmission lines.	
CO3	Analyze behavior of different passive components using s-matrix.	
CO4	Measure performance parameters of microwave devices.	
CO5	Explore microwave solid state devices.	

Course Name: Digital Communication		Course Code: ET 2403/ ET 2404
CO1	Analyze various source coding techniques.	
CO2	Illustrate signal space concepts.	
CO3	Elaborate digital modulation techniques.	
CO4	Analyze different channel coding techniques	
CO5	Apply spread spectrum modulation for various applications of communication systems.	

Course Name: PE III : Power Electronics		Course Code: ET 2411
CO1	Design circuits using power semiconductor devices.	
CO2	Analyze AC/DC , DC/DC and DC/AC and Cyclo-converters.	

CO3	Design of Gate Drive and snubber circuits for SCR
CO4	Elaborate AC ,DC drives and SMPS

Course Name: PE III : Data compression and encryption		Course Code: ET 2412
CO1	Elaborate text, audio, image and video compression techniques.	
CO2	Elaborate data and network security issues.	
CO3	Implement text compression Techniques.	
CO4	Implement Symmetric and Asymmetric Key Cryptography schemes.	

Course Name: PE III : Analog VLSI Design		Course Code: ET 2413
CO1	Elaborate small and large signal models of MOS transistor amplifiers and ADC, DAC, Sigma-delta converters.	
CO2	Analyze single stage, Differential and operational amplifier circuits.	
CO3	Analyze Performance parameters of ADC, DAC, Sigma-delta converters.	
CO4	Design single stage, Differential and operational amplifier circuits and ADC, DAC, Sigma-delta converters.	

Course Name: PE III : Error Correcting Code		Course Code: ET 2414
CO1	Elaborate the various codes for error detection & correction	
CO2	Apply the concepts of information theory for source and channel coding/decoding.	
CO3	Determine error detecting and correcting capability of linear & block codes	
CO4	Analyze error control capability for cyclic, BCH and Convolutional codes.	

Course Name: PE III : Wireless Mobile Communication Systems		Course Code: ET 2415
CO1	Analyze Cellular concept and mobile radio propagation	
CO2	Illustrate types of equalization, diversity technique & multiple access techniques for wireless communication.	
CO3	Elaborate concepts of GSM and CDMA	
CO4	Explain wireless networking for mobile communication.	

Course Name: PE IV : Satellite Communication & RADAR Engineering		Course Code: ET 2421
CO1	Elaborate satellite services, satellite system and propagation of satellites.	
CO2	Illustrate Earth station technology and tracking of satellites.	
CO3	Analyze the RADAR range equation, Doppler principle and types of radars	
CO4	Elaborate RADAR antennas, Duplexers, clutters and the effects of weather on radar	

Course Name: PE IV : Embedded System		Course Code: ET 2422
CO1	Explain the architectural features of ARM processors	
CO2	Apply ARM instruction set for development of assembly language programs.	

CO3	Explain ARM floating point architecture and DSP extensions
CO4	Apply the knowledge of embedded C to interface Wi-Fi module ESP 8266, ESP32 and Node MCU with various peripherals.
CO5	Elaborate memory management in ARM and architectural support of operating system.

Course Name: PE IV : Switching Theory		Course Code: ET 2423
CO1	Analyze technology mapping & threshold networks	
CO2	Analyze fault models and testing principles in combinational and sequential circuits	
CO3	Design the synchronous, asynchronous sequential circuits and finite state machines.	
CO4	Analyze behavior of FSM, test generation of sequential circuits, design for testability & BIST through experimentation.	

Course Name: PE IV : Topics in Machine Learning		Course Code: ET 2424
CO1	Apply and analyze the model using regression.	
CO2	Apply Supervised and unsupervised learning for problem solving.	
CO3	Apply neural network algorithms for classification.	
CO4	Evaluate deep neural network with computational complexity.	

Course Name: PE IV : Multimedia Communications		Course Code: ET2425
CO1	Explain the fundamental concepts of multimedia systems	
CO2	Elaborate image ,audio and video compression techniques	
CO3	Implement Wavelet based image compression and video compression techniques	
CO4	Illustrate various multimedia network protocols	
CO5	Explain concepts of image retrieval from digital libraries	

Course Name: PE V : Display Technology		Course Code: ET 2431
CO1	Identify different display technologies and manufacturing process.	
CO2	Analyze characteristics of display devices and Luminescence materials.	
CO3	Analyze addressing matrix, TFT backplane and backlight unit technologies.	
CO4	Elaborate advanced display devices and Materials.	

Course Name: PE V : Biomedical Instrumentation		Course Code: ET 2432
CO1	Elaborate Fundamentals of Biomedical Instrumentation and its Electrodes	
CO2	Explain the measuring and recording instruments	

CO3	Describe the functioning of imaging systems.
CO4	Describe the functioning of therapeutic equipment's

Course Name: PE V : Fuzzy Logic & Neural Networks		Course Code: ET 2433
CO1	Examine fuzzy logic, neural network and deep learning models	
CO2	Apply fuzzy logic for solving problems	
CO3	Apply supervised/unsupervised algorithms for pattern recognition	
CO4	Analyze the concepts of deep learning models for computer vision analysis	

Course Name: PE V : Wireless Sensor Networks		Course Code: ET 2434
CO1	Elaborate common wireless sensor networks.	
CO2	Elaborate network, physical and MAC layer for WSN.	
CO3	Explain Localization and positioning system for WSN	
CO4	Explain topology, and clustering methods for WSN	
CO5	Explain different routing protocols for WSN	

Course Name: PE V : RF Circuit Design		Course Code: ET 2435
CO1	Analyse the behaviour of series and parallel RLC circuit at High Frequency.	
CO2	Elaborate the MOSFET based circuit design and different bandwidth estimation techniques.	
CO3	Design high frequency amplifier for RF applications	
CO4	Explain RF Power Amplifiers, Phase Detectors and biasing of RF Circuit	

Course Name: PE VI : CMOS VLSI Design		Course Code: ET 2441
CO1	Elaborate the characteristics of MOSFET, MOSFET based circuits and process of CMOS circuits fabrication	
CO2	Design the MOSFET inverters, combinational and sequential circuits.	
CO3	Design optimized CMOS circuits and layouts	
CO4	Analyze switching characteristics and interconnection effects of MOS device, advance CMOS logic circuits	

Course Name: PE VI : Digital Image Analysis for Remote Sensing		Course Code: ET 2442
CO1	Elaborate the basic and applied principles of remote sensing and RS image characteristics	
CO2	Evaluate image spatial and spectral transforms and their effect on image quality and data integrity	
CO3	Apply the image correction techniques and classification algorithms on remote sensing images	
CO4	Analyze high-dimensional remote sensing imagery with appropriate remote sensing data and processing methods	

Course Name: PE VI : Microwave Integrated circuits		Course Code: ET 2443
CO1	Explain the planar transmission lines.	
CO2	Design active and passive components and planner antennas using microstrip lines.	
CO3	Design active and passive circuits using microstrip lines.	
CO4	Elaborate different active and passive components and Microstrip Patch antenna.	
CO5	Elaborate the fabrication process of MIC Devices and Components.	

Course Name: PE VI : Communication Networks		Course Code: ET 2444
CO1	Select the appropriate topologies and techniques for design of communication system	
CO2	Elaborate the design techniques and protocols of computer networks.	
CO3	Elaborate flow control and error control techniques in communication network	
CO4	Solve problems based on evaluation of errors, class-full & classless addressing and data security in communication networks.	

Course Name: PE VI : Computer Architecture and Organization		Course Code: ET 2445
CO1	Elaborate the fundamentals and advanced concepts in computer organization	
CO2	Explain Instruction set architecture of a CPU	
CO3	Elaborate the fundamentals of control unit design and memory hierarchy	
CO4	Explain the concepts of parallel processing and peripheral interfacing	

Course Name: PE VI : PLCs & SCADA		Course Code: ET 2446
CO1	Explain the basic building blocks of Programmable logic controller.	
CO2	Develop PLC and SCADA programs for industrial automation	
CO3	Illustrate the concepts involved in HMI & SCADA	
CO4	Elaborate the concepts in distributed control systems	

Course Name: Mini Project		Course Code: ET 2409
CO1	Identify, formulate and analyze complex engineering problems through literature survey.	
CO2	Apply knowledge to assess health, social, safety and environmental issues.	
CO3	Implement core /multidisciplinary/ industry based electronics projects in cost effective manner.	
CO4	Communicate technical details effectively	

Course Name: Campus Recruitment Training (CRT)	Course Code: ET 2410
CO1	Write effectively in English.
CO2	Analyze logically and critically on different issues.
CO3	Solve quantitative problems effectively.
CO4	Apply fundamentals of Electronics and Telecommunication for practical applications.

Fourth Year: Semester VIII:

Course Name: Major Project	Course Code: ET 2451
CO1	Design and analyze application based electronic systems.
CO2	Implement core / multidisciplinary / industry based electronics projects in cost effective manner.
CO3	Communicate technical details effectively

Course Name: Extra curricular Activity Evaluation	Course Code: ET 2452
CO1	The students will be able to demonstrate their involvement and achievement in Extra/Co curricular Activities which they have exhibited throughout the program

Computer Technology

Department of Computer Technology Course Objectives and Course Outcomes

Session 2020-21

Sr.	Course Code	Subject	Course Objectives	Course Outcomes
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Upon successful completion of the course students will be able to:

Semester III (2018-2019 SoE)				
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	GE1201	Engineering Mathematics-III	Estimate the Calculus of Numerical Function.	Estimate the Calculus of Numerical Function.
			Determine the transforms and inverse transforms of various functions of variables and use it to solve Mathematical equations.	Determine the transforms and inverse transforms of various functions of variables and use it to solve Mathematical equations.
			Discuss the nature of periodic function and express it in terms of series.	Discuss the nature of periodic function and express it in terms of series.
			Use appropriate method/s to solve partial differential equations.	Use appropriate method/s to solve partial differential equations.
	CT2204 CT-2205	Data Structures Data Structures Lab	Implement given problem using various programming construct. logic needed for solving given problem.	Implement given problem using various programming construct. logic needed for solving given problem.
			Elaborate various abstract data types through implementation.	Elaborate various abstract data types through implementation.
			Use dynamic memory allocation functions.	Use dynamic memory allocation functions.
			Summarize various file handling mechanism	Summarize various file handling mechanism
	CT2202	Object-Oriented	Understand the concept of object-oriented programming	Apply the knowledge of basic concepts of object-oriented programming
			Have an appreciation of the object-oriented	Apply the concepts of object-oriented concepts like encapsulation,
			Gain an understanding of generic components and how	Apply the knowledge of I/O stream and generic components in the
	CT2206	Python Programming	Develop an understanding of MVC architecture and how	Formulate the standardized event driven solution for the real life
			To make student aware about various programming	Select any framework for python programming as per their
			To make student familiar with syntax of various data	Write any python program using various data structures and control
	CT-2201	Computer Architecture & Organization	To make students comprehend concepts of file handling.	Write program where file handling and concepts of classes and objects
			To make student aware about various packages inbuilt in	Develop advanced applications using functionalities provided under
			To understand Internal working of Computer System, its	Relate the function of the various units of computers that process data
	CT2207	Web Technology Laboratory	To describe basic processor design using Hardwired and	Write control signal for executing machine instructions for different
			To observe organization of main memory, cache	Design the organization of memory, memory hierarchy, other peripheral
			To know Various ways in which I/O operations are	Compare among different types of I/O operation
	CT2207	Web Technology Laboratory	Introduction to internet technology	Illustrate various internet technologies.
			Study of basic of web page designing and validations	Design the web pages using some basic techniques.
			Introduction to the concepts of data storage using XML	Implement the XML technology to store the data.
			Learn the advance technique for designing the interactive	Develop the interactive web pages using the advanced technique.

Semester IV (2018-2019 SoE)				
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1	CT-2255 CT-2256	Mathematical Foundations for Data Analysis Mathematical	To introduce the basic statistical formulae and	Implement statistical formulae and visualization techniques
			To comprehend the concepts of probability and	Solve the real-life problem using the probability theory
			To understand the concepts of sampling, sampling	Analyze the problem to predict the solution using the estimation theory
			To understand the concept of hypothesis testing	Write conclusion using hypothesis testing
2	CT-2257 CT-2258	Database Management Systems and Lab	To learn different database system concepts	Compare different levels of abstraction & data independence
			To learn the designing of Entity Relationship Diagram.	Design Entity Relationship Diagram for any scenario
			To know relational data model, relational algebra & SQL	Solve queries based on relational algebra & SQL
			To understand the normalization concepts	Identify functional dependencies & normalize the database
3	CT-2253CT-2254	Advanced Data Structures and Lab	To learn transaction management, various concurrency	Analyze transaction management, various concurrency control protocols
			To Get overview of fundamental data structures and their	Implement the concept of linked list, skip lists, disjoint sets, trees, graph
			To Explore different operations performed on various	Design suitable hash function for the given data set
			To Understand practical implementation of different	Perform different operations on multidimensional trees
4	GE2206	Discrete Mathematics & Probability Theory	To Comprehend working of advanced data structures	Select appropriate data structure for implementation of real world
			To Compare different data structures	
			Understand mathematical logic and set theory and	Explain the basic concept of classical sets, fuzzy sets, Relations,
				Identify the nature of different algebraic structures such as Group, Ring,
5	CT2251 CT2252	Operating Systems and Lab	Analyze the graphs and spanning of trees	
				Determine the probability, Expectations of functions of two random
			To identify different types of OS & services provided by	Explain different OS & its services.
			To infer process management and inter-process	Illustrate CPU scheduling algorithm and different ways to synchronize
			To interpret the deadlock concepts& deadlock avoidance	Use different methods to handle deadlock.
			To understand the need of memory management.	Articulate various memory management techniques.
			To classify different file system organization.	Differentiate various disk scheduling algorithms based on their performances.

Semester V (SoE 2018-19_REV SOE)				
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1	GE-2312	Fundamental of Economics	It introduced the concept of economics and provides	Recognizes consumer's behavior and pricing
			This introduced various factors of production and its role	Extrapolates an operations in market with productions constrain.
			It provide knowledge to the students about various	Describes the national income accounting and public finance.
			It gives knowledge about various national products, its	Interprets international trade and institutions.
2	CT2301/CT2302	Computer Networks and Lab	Provide knowledge of functioning of money, financial	
			The architecture and principles of today's computer	Identify appropriate design issues and explain network reference model.
			The protocols and their functionalities	Select appropriate protocol at various layers for the given application.
			The requirements for the future Internet and its impact	Solve problems in the networking domain.
			Analyze the performance of network using different tools	

3	CT2303	Theoretical Foundation of Computer Science	To introduce students to the mathematical foundations of To understand of different types of grammars and the To study the concepts of Push Down Automata and To understand decidable and undecidable problems	Construct automata, regular expression for any pattern Write context free grammar for various languages Design push down automata and Turing Machine for a language Derive whether a problem is decidable or not	
4	CT2327	OE I: Image Processing	Overview the Fundamental concepts of Digital Image Explore image enhancement techniques in spatial domain Understand the fundamental concept of image Study of various similarity based, and dissimilarity-based Understand the basic concepts of image representation	Describe basic relationships between pixels Compare various image enhancement techniques in spatial domain and Illustrate different image compression techniques to understand the Demonstrate the applications of similarity based and dissimilarity-based Interpret various representation techniques	
5	CT2331	OE II: Soft Computing	Understand the applications of soft computing in various Have an appreciation of Fuzzy logic and its applications Gain an understanding of Rough Set theory and its usage Develop an understanding of single-objective Introduce artificial neural networks and its applications.	Review applications of soft computing to solve problems in varieties of Demonstrate Fuzzy logic and its applications Explain Rough Set theory and its usage as soft computing Relate single-objective optimization problems using GAs. Describe Artificial neural networks and its applications	
6	CT2334	OE II:Multimedia and Animation	Gain fundamental knowledge of multimedia Understand the technologies in multimedia & animation Learn the basics of animation	Understand multimedia basics - hardware and software Develop skills in design, illustration, image manipulation, graphic Develop the skills in Animation software.	
7	CT1343	Operating System Concepts	To understand the concepts of Linux and its potential To get a knowledge of shells	Use LINUX operating system Write Shell scripts	
8	CT2313/CT2314	PE I: Mobile Operating Systems/ Mobile Operating Systems Lab	Understand different Mobile Operating Systems and to To have basic requirement & different controls for Gain an understanding data management & inter To learn application configuration & publishing.	Compare different flavors of mobile operating system and their specific Create an application using different controls Prepare a project which can manage data and can communicate with Publish the designed application which can handle multiple devices with different configurations.	
9	CT 2317/CT 2318	Introduction to Geographical Information System /	To get an overview of fundamental concepts of GIS, To explore the Coordinate Systems, Map Projections To comprehend the Making and sharing of maps	Demonstrate the fundamental concepts of GIS Develop the apprehension of various concepts in GIS Design and share maps	
10	CT2332	OE II: Software Testing	Understand Software testing fundamentals/principles. Learn systematic approach to software testing using strategies. Explore Methods and tools of testing software.	Formulate problem by following Software testing life cycle. Design Manual Test cases for Software Project. Demonstrate utilization of testing automation through testing tool.	
11	CT2315/CT2316	PE I: Advanced Web Technologies/ Advanced Web Technologies Lab	To learn basic aspects of Web services, Server side scripting, Advanced CSS To introduce with AJAX To learn Basics of Advanced Client side programming To learn JavaScript	Design Web pages using HTML5, CSS3 Perform various operations using AJAX Use features of Client side programming Develop Web pages using JavaScript	
12	CT2319 /CT2320	PE I : Computer Graphics	To learn basic aspects of computer graphics To learn aspects of visual communication and understand presentation issues in computer graphics To learn interactive handling of images and text To understand computer animation and design animation program	Draw lines and polygons and fill polygons using basic graphics functions Select proper imaging technology to be used for image creation Handle interactive software with images & text Develop animated programs for various applications	
13	CT2335	OE II: Current Trends and Technologies	Gain fundamental knowledge of electronic communication Understand the technologies in Internet, e-Technologies & e-Learning Learn the basics of Green Computing and its implementation in industries Develop the understanding of concepts in Social Media	Use the basics of internet for deployment of various servers and recourses Design and implement technologies for e-Commerce and e-Learning Choose appropriate implementation of Green Computing Make use of Social Networking properly and securely	
14	CT2323/CT2324	PE I : Privacy and Security in Online Social Networks (PSOSN)	To learn the use of different APIs and tools for collecting online social networking data To understand privacy and policies for online social media To understand eCrimes and Attacks in online social media To learn profile linking on online social media	Collect online social networking data using different tools and APIs Review privacy and policies in social media Categorize eCrimes and Attacks in OSM Link profiles of user on OSM	
15	CT2311	Randomized Algorithms	To understand basic concepts of probability calculus in algorithmic context To analyze the expected running time of simple randomized algorithms To understand simple randomized algorithms that run fast or that return the correct output with high probability To study the probabilistic method to show the existence of certain combinatorial objects	Apply basic concepts of probability calculus in algorithmic context Derive good upper bounds for the expected running time of simple randomized algorithms Design simple randomized algorithms that run fast or that return the correct output with high probability Apply the probabilistic method to show the existence of certain combinatorial objects	
Semester VI (SoE 2018)					
1	CT2351/CT2352	Design & Analysis of Algorithms/ Design & Analysis of Algorithms Lab	To Understand different asymptotic notations To Have an appreciation of different mathematical To Gain an understanding and apply various algorithm To understand various complexity classes like P, NP, NP-complete and NP-Hard	Analyze algorithms to find the time complexity in terms of asymptotic notations Solve recurrences using various techniques. Implement and analyze different algorithms like divide and conquer strategy. Compare different types of complexity classes and categories algorithms into specific complexity class	
2	CT2355 /CT2356	Software Engineering / Lab	To Study software engineering best practices and To Explore the various testing types and its strategies To Understand configuration management, version To Understand project management, planning, To Get an overview of open source Software	Choose appropriate software engineering process model, requirement Select appropriate testing strategy and apply testing principles for testing a Apply basics of software configuration management, version control and Evaluate cost estimation, effort and severity of software risk for given Perform basic operations on Sub-version for software version control	
			To study the structure of Compiler and FLEX tool for generating lexical analyzer	Design lexical analyzer using FLEX tool	

3	CT2353/CT 2353	Language Processors / Lab	To explore top down, Bottom up parsing approaches and YACC tool for generating syntax analyzer	Implement syntax analyzer using YACC tool
			To understand Syntax Directed Translation Scheme	Create a syntax-directed definition and an annotated parse tree
			To introduce Symbol Table Management and Error Detection and Recovery with respect to all phases of	Demonstrate the use of a symbol table throughout compilation
			To understand Code optimization and Code generation techniques	Apply various code optimizing transformations and code generation techniques
4	CT2365/CT2 366	Business Intelligence and its Applications / Lab	To Understand the concept of business intelligence, digital data and the multidimensional data modeling	Explain the basic concepts of Business Intelligence and multidimensional modelling and able to compare digital data types.
			To Have an appreciation of the process of building of multidimensional data model and various operations that can	Build and operate the multidimensional data model for the specific scenario to extract the information.
			To Gain an understanding of how to measure and present the business information	Analyze the business information to construct the reports from it
			To Develop an understanding of application of the business intelligence in the real-world scenario	Decide the mode / channel to implement the business intelligence solution for the specific problem.
5	CT1352	Current Trends & Technology	To Gain fundamental knowledge of electronic communication	Use the basics of internet for deployment of various servers and recourses
			To Understand the technologies in Internet, e-Technologies &	Design and implement technologies for e-Commerce and e-Learning
			To Learn the basics of Green Computing and its implementation	Choose appropriate implementation of Green Computing
			To Develop the understanding of concepts in Social Media	Make use of Social Networking properly and securely
6	CT2372	Essentials of IT	To understand basics of algorithm design, object	Develop algorithm and write pseudo code for a given problem statement
			To understand the database system concepts, relational	Construct Entity-Relationship Model and design RDBMS for a given problem
			To understand basics of web page design and Javascript	Design static and dynamic web pages using HTML and Javascript and write
			To understand software engineering basics and various	Apply software engineering concepts in any software project implementation
7	CT2329	OE-I: Introduction to Salesforce	To realize the concepts and principles of Salesforce CRM	Employ the knowledge of customer-centered organization and
			To appreciate the role and changing face of Salesforce CRM	Represent a customize a CRM application for organization to suit their
			To have knowledge of a CRM implementation in aura	Determine CRM strategies by understanding customers' preferences for
			To understand basic aspects of Natural languages used in	Describe linguistic phenomena with formal grammars
8	CT-2367	PE II: Introduction to Natural Language Processing	To get acquainted with the basic concepts and	Illustrate and test algorithms for NLP problems
			To Learn the mathematical and linguistic foundations	Examine NLP applications
			To appreciate underlying approaches for the various areas in NLP	Devise real world NLP applications using NLP techniques
			To Get acquainted with various IOT environments	Develop various IOT environments
9	CT2363	PE II: Internet of Things	To Study IOT architecture and its enabling technologies	Demonstrate IOT architecture and its enabling technologies
			To Acquire hands on laboratory experience, utilizing	Analyze IOT environments using various communication technologies
				Apply various IOT enabling technologies for creation of IOT environments
10	CT2323	OE I: Image Processing	To Overview the Fundamental concepts of Digital Image	Describe basic relationships between pixels
			To Explore image enhancement techniques in spatial	Compare various image enhancement techniques in spatial domain and
			To Understand the fundamental concept of image	Illustrate different image compression techniques to understand the
			To Study of various similarity based, and dissimilarity-	Demonstrate the applications of similarity based and dissimilarity-based
11	CT2381	OE IV: Soft Computing	To Understand the basic concepts of image	Interpret various representation techniques
			To Understand the applications of soft computing in various d	Review different applications of soft computing to solve problems from
			To Have an appreciation of Fuzzy logic and its applications	Demonstrate Fuzzy logic and its applications
			To Gain an understanding of Rough Set theory and its usage a	Explain Rough Set theory and its usage as soft computing
12	CT2382	OE IV: Software Testing	To Develop an understanding of single-objective optimization	Relate single-objective optimization problems using Gas
			To Introduce artificial neural networks and its applications	Describe Artificial neural networks and its applications
			To Understand Software testing fundamentals/principles	Formulate problem by following Software testing life cycle
			To Learn systematic approach of software testing	Design Manual Test cases for Software testing approaches
13	GE: 2311	FUNDAMENTAL OF MANAGEMENT	To Explore methods and tools of testing software	Demonstrate utilization of testing automation though testing tool
			The objective of this course is to endow the student with a broad perspective on themes and issues of Human Resource Management, Human Resource Development, Training and Development activities, Job Analysis, Performance Appraisal, disciplinary and grievance procedure. It will help the students to build up and refine decision making skills so that they can help organizations effectively manage employee relations.	Explain the Legal provision and Functions of Management.
				Analyze the role of Human Resource and Financial Management in the
				Analyze the project life cycles.
14	CT2361	PE II: Digital Image Processing		Describe Basic relationships between pixels
			To Explore image enhancement techniques in spatial domain	Compare various image enhancement techniques in spatial domain and
			To Understand the fundamental concept of image	Illustrate different image compression techniques to understand the advantage
			To Study various similarity based, and dissimilarity-based	Demonstrate the applications of similarity based and dissimilarity-based
15	CT2369/CT2 370	PE I: Customer Relationship Management(CRM)	To Understand the concepts and principles ofSalesforce CRM	Apply the knowledge of customer-centered organization and implement the integral processes within an organization that are automated and how
			To Appreciate the role and changing face ofSalesforce CRM as an IT enabled function	Design a customize a CRM application for organization to suit their business needs
			To Implement a CRM using apexin aura framework by understanding the business caseand importance of	Analyze the result of developed CRM application from various perspectives for implementing it
Semester VII (SoE2014-15_REV SOE)				
1	CT1451	Artificial Intelligence	To understand fundamental concepts in Artificial	Describe different concepts of AI, and illustrate working of different
			To describe different searching algorithms in AI	Differentiate between searching algorithms and apply appropriate
			To explain different knowledge representation	Select appropriate knowledge representation technique to represent real
			To comprehend various non-monotonic reasoning	Demonstrate the working knowledge of reasoning in the presence of
2	CT 1415	Network Security	To explain different learning methods along with	Analyze learning approaches and recall AI basics for expert system.
			Understand the security threats aimed at computer	Identify threats to network security, associated attacks and
			Study cryptographic mathematics to solve network	Use appropriate mathematical techniques in cryptography
			Study of various cryptographic algorithms.	Apply various algorithms/ mechanisms to formulate appropriate
3	CT1408	Cloud Computing	Understand different security protocols at various layers	Use of different security protocols at various networking layers.
			To Understand cloud architecture and identify various	Explain software and hardware support for enterprise and cloud
			To Develop an apprehension of cloud computing stack	Perform data modeling for enterprise and cloud knowledge bases
			To Understand and apply abstraction and virtualization	Design enterprise and cloud software applications

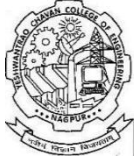
				To Explore cloud infrastructure and understand cloud	Implement and run distributed and cloud applications
				To Classify various cloud security management standards	Ensure security and privacy in enterprise and cloud application while
	4	CT1405	Embedded System	To make the students aware of the Embedded Systems	Use the Basics of ES and decide the components of an ES
				To make students aware about the types of processors &	Develop understanding of the hardware & software integration to
				To apply concepts of Real Time Operating System,	Choose appropriate processors and Real Time operating system for ES
				To apply different types of instruction sets for	Choose appropriate instruction sets to develop programs for
	5	CT1454	Machine Learning Techniques	The basic concepts of machine learning and the relative	Interpret machine learning techniques suitable for a given problem
				To understand the concepts of different types of machine	Apply machine learning techniques to solve the problems
				To understand the different methods of evaluation of	Compare machine learning techniques
				To understand different ensembling methods and new	Evaluate different machine learning techniques
	6	CT1406	Neural Network and Fuzzy Logic	To understand the fundamentals of biological neural	Illustrate the fundamentals of Biological Neural Network and Artificial
				To understand the architecture of feed forward and	Develop the solution for problem based on ANN using feed forward and
				To understand the operations and properties of classical	Comprehend the various concepts of fuzziness involved in fuzzy set
				To understand defuzzification methods used in fuzzy	Formulate fuzzy inference system using fuzzification and
	7	CT1453	Probabilistic Statistical and Data Analysis	To understand statistical formulae and probability for	Identify the hidden meaning in the data by applying some basic
				To comprehend the concepts of estimation and	Employ the sampling techniques to find the estimates and test its validity
				To appreciate the statistical techniques for studying and	Analyze sample data to make inference about the population data.
				To learn the modeling techniques simple and multiple	Design the predictive model using simple and multiple regression
				To understand the Knowledge about current trends in	Infer the Knowledge about current trends in industry
	8	CT1413	Student Training	To learn how to deliver Technical presentation	Deliver Technical presentation
				To understand and analyze Communication media	Communicate effectively
				To examine and evaluate question asked.	
	9	CT 1437	Parallel Computing	To provide basics of concepts related to parallel	Identify areas where parallel computing is applicable
				To understand principles of parallel algorithm design	Implement parallel version of different algorithms using thread
				To understand performance measuring metrics for	Find the speedup factor by analyzing parallel programs
				To familiarize with different directives of parallel	Develop real life applications using parallel programming
	10	CT1407	Ad-hoc Wireless Network	To Understand the various design issues and challenges	Compare the differences between cellular and ad hoc networks and
				To Study security aspect of communication in ad hoc	Summarize the protocols used at different layers of Adhoc network.
				To Understand Quality of Service and energy	Identify the various types of attack in ad hoc network
					Classify QoS approaches and Identify the need of energy management in
	11	CT1457	Fundamentals of Parallel Computing	To provide basics of concepts related to parallel	Identify areas where parallel computing is applicable
				To understand principles of parallel algorithm design	Implement parallel version of different algorithms using thread
				To understand performance measuring metrics for	Find the speedup factor by analyzing parallel programs
				To familiarize with different directives of parallel	Develop real life applications using parallel programming
	12	CT 1414	Major Project Phase I	Develop their own ideas.	Identify real life technical problem, conduct literature survey, and find
				Interact with outside world.	Analyze the problem and identify suitable tools and technologies for
				Work in a group in a collaborative and productive	Communicate proposed solution effectively with proper presentation

Semester VIII (SoE 2014-2015)

1	CT1445 CT 1446	Numerical Computing Numerical Computing Lab	To Understand basics of error induced in numerical computation	Apply appropriate formula to find different types of error in numerical computation and mitigate it.
			To Develop numerical algorithms and skills to implement algorithms to solve mathematical problems on	Choose appropriate numerical techniques for problem solving interpret the results and assess accuracy
			To Learn technologies to solve integration numerically	Apply appropriate techniques for numerical integration.
			To Understand techniques to solve differential equations and systems of equations for convergence of iteration	Demonstrate basics of conditioning of problems and stability of numerical algorithms
2	GE1408	Cyber Laws	To understand the basic concepts of Cyber Law.	Describe the laws governing the national/international cyber space, IT
			To understand concepts, principles, and strategies	Recognize the importance of digital evidence/licensing regulations and
			To understand IT Law in India as well as on international	Understand offences and penalties for cybercrimes under IT Act through
			To understand concepts of E commerce and Law.	Identify/recognize implications of cyber laws on issues related to intellectual property rights, commercial transactions and develop a strategy to deal with them.
3	CT1450	Object Oriented Modeling	To Understand the object-oriented modeling techniques	Identify, analyze, and model structural and behavioral concepts of the
			To Understand system development life cycle, and steps	Analyze & implement system design, database management, handling
			To Understand the various aspects of system design.	Implement designed model using the object-oriented language & object-
			To Understand class implementation modeling, object-	
4	CT-1455 / CT1456	Cyber Forensics /Cyber Forensics Lab	To Comprehend different modern techniques with respect	Investigate hardware parts of a computer system for evidences
			To Comprehend different forensic tools used in cyber fore	Use different tools for data acquisition and duplication for forensic study
			To Understand different legal techniques and aspects for	Securely store data and evidence collected
			To Understand the process of compilation of report writin	Create report of forensic investigation made
5	CT1420/CT 1421	Pattern Recognition/ Pattern Recognition Lab	To Understand concepts and basic approaches to the development of pattern recognition system and related theory of random variable, distribution and density functions	Demonstrate the concepts of pattern recognition, probability, random variable, density function, different feature extraction techniques and solve problems for the given data
			To Understand parameter estimation methods for discrete	Compute the parameters for different density functions and interpret it
			To Understand basics of decision boundaries and discrim	Design appropriate pattern recognition solutions to classification, regression, and clustering problems.
			To Understand concept of feature extraction and differen	Evaluate and interpret the results of the applied techniques to solve pattern recognition problem
6	CT1418/CT1 419	PE IV: Digital Image Processing(Th)/ Digital Image Processing(Lab)	To Overview the Fundamental concepts of Digital Image	Describe Basic relationships between pixels.
			Explore image enhancement techniques in spatial domain and frequency domain	Compare various image enhancement techniques in spatial domain and frequency domain.
			To Understand the fundamental concept of image compression	Illustrate different image compression techniques to understand the advantage of image compression
			To Study various similarity based, and dissimilarity-based image segmentation approaches.	Demonstrate the applications of similarity based and dissimilarity-based approaches for image segmentation.
			To Understand the basic concepts of image representation and	Interpret various representation techniques
7	CT1458/CT1 459	PE V: Introduction to Internet of Things/ Introduction to	To Get acquainted with various IOT environments.	Design and evaluate various IOT environments.
			To Study IOT architecture and its enabling technologies.	Describe IOT architecture and its enabling technologies.
			To Acquire hands on laboratory experience, utilizing IOT kit.	Analysis IOT environments using various communication technologies.

			Internet of Things Lab		Apply various IOT enabling technologies for creation of IOT environments
	8	CT 1426	Major Project Phase II	To Realize their technical ideas into a working model To Interact with outside world To Work in a group in a collaborative and productive	Analyze the solution and achieve desired results Write paper and present the research work in team Acquire in-depth knowledge of subject for benefit of society
	9	CT1427	Extra Curricular Activities	To Student will peruse his hobbies and interests. To Understand how to work in team. To Understand how to carry out activities	Develop his hobbies and interests Communicate and work in team Develop the sense of responsibility
	10	CT1425	Comprehensive Viva	To Understand the concepts of the courses learned To Prepare the students to face interview both in the	Comprehend various subjects applications to computer technology Performance in campus recruitments

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COURSE OUTCOMES (COs)

1st / 2nd SEMESTER

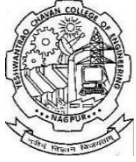
IT2101 - Introduction To Computer Programming

After completion of the course students will be able to

1. Understand computer system, basics of algorithm & flowchart, and demonstrate straight line program using basic 'C' programming language constructs.
2. Design & Develop programs using different loop control structures, user defined functions, and Pointers
3. Analyze and apply concepts of different dimensional Arrays as a data structure & development of programs using the same.
4. Design and develop programs using basics of Strings, Structures, union and Files in 'C' language.

3rd SEMESTER

GE1201-Engineering Mathematics – III



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After completion of the course students will be able to

1. know the techniques to find the missing terms in discrete data and numerical integrations for discrete value functions.
2. Identify with Laplace transform & inverse Laplace transforms of various types of functions, its properties and its application to solve differential equations and acquire an ability to use it in Engineering subjects like control system, Network analysis and digital signal processing
3. find the z-transform, inverse z-transform of a sequence, identify its region of convergence and develop an ability to explore and solve problems in various branches of Engineering. solve partial differential equations.
4. Recognize to determine the solution of linear systems of equations using matrices methods, find Eigen values and Eigen vectors and come across in solving applied problems. Fourier transform & series

IT1201-Introduction to Information Technology

After completion of the course students will be able to

1. Students will be able to Understand Basic aspects of Information System and program development Methodology and knowledge of software development life cycles for software development.
2. Apply Data encoding/Decoding and compression Techniques
3. Analyze different computer Generations and Computer Systems for development of software system.
4. Understand basic concepts of operating system, analyze the problem definition and formulate queries in SQL, Computer networks, internet technology, E-Commerce and Various Application

IT1206-Microprocessor Based System Design+IT1207 LAB

After completion of the course students will be able to

1. To understand basic architecture and instruction set of 16 bit microprocessors
2. To design and interface 16 bit microprocessor with memory and peripheral chips involving system design.
3. To understand interrupt structure of 8086 and study the architecture and interfacing of IC 8259.



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4. To understand and interface serial communication IC and USART.

IT1204-Algorithms & Data Structures + IT1204 LAB

After completion of the course students will be able to

1. Understand basic data structures like list, stack, queue, tree, graph and hash table.
2. Apply appropriate data structures in problem solving.
3. Analyze the performance of sorting and searching algorithms based on data structures.
4. Design application by using data structures and algorithms for real world problems

EE1213- Digital Circuits & Switching Theory +LAB

After completion of the course students will be able to

1. understand and learn the concepts of logic Circuits and designing of basic circuits using logic gates, basic combinational logic circuits.
2. Acquainted with the new concepts related to simplification of combination logic circuits using Boolean algebra, K- maps & Quine McCluskey's method
3. Understand Memory organization, basic working of Flip-Flops their conversation and designing of counters, Registers.
4. Demonstrate use of sequential logic , their applications and apply concepts of the state reduction techniques for machine minimization



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4TH SEMESTER

IT1208-Computer Architecture & Organization.

After completion of the course students will be able to

1. Describe fundamentals of computer architecture and organization
2. Understand control unit operations and performances issues.
3. Apply mathematical techniques and perform computer arithmetic operations.
4. Design organization of memory and understand the concept of cache mapping techniques.

IT1202-Object Oriented Programming + LAB

After completion of the course students will be able to

1. Demonstrate the understanding of Object oriented concepts.
2. Apply the programming language JAVA efficiently in object oriented software development
3. Able to analyze problem statement and identify appropriate objects and methods
4. Design and implement a small programs using classes
5. Design, develop, test, and debug programs using object oriented principles of java

IT1209-Theory of Computation



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After completion of the course students will be able to

1. To apply basic properties of formal languages & to construct Finite automata, to write regular expression and Regular Grammar.
2. To analyze & design different types of Grammars.
3. To apply properties of CFL & design of Push Down Automata
4. To analyze & design Turing machine & demonstrate basic concept of Recursive Language, undecidability, post Correspondence problem & Recursive enumerable language

IT1210-Lab: Computer Workshop

After completion of the course students will be able to

1. Know various hardware components of a Personal Computer and how to connect them to form a complete system.
2. Understand the uses of various Computer Networking Accessories like switches, connectors, communication media, etc.
3. develop and test a python application for a given problem statement
4. Write technical documents professionally using Latex.

ET1215-Information Theory and Communication + LAB

After completion of the course students will be able to

1. Know the fundamentals of signals, analog communication and digital communication and modulation methods
2. Apply the knowledge of probability and random processes on communication systems
3. Grasp basic of waveform coding techniques



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4. Describe the terms entropy, information and design of source encoding and channel encoding and decoding

5TH SEMESTER

IT1303 Operating Systems + IT1304 Lab:

After completion of the course students will be able to

1. To review computer hardware and to understand the fundamental concepts in Operating Systems.
2. To apply and analyze algorithms and techniques for managing various OS resources
3. To evaluate the performance of algorithms for managing various OS resources using appropriate parameters
4. To simulate algorithms/techniques for managing various OS resources.

IT1305 Software Engineering + IT1306 Lab

After completion of the course students will be able to

1. Understand and apply the software testing techniques in a variety of ways to test the software.
2. Demonstrate an ability to use the techniques and tools necessary for software engineering practices
3. Analyze and evaluate the different software process model and appropriate architectural style while developing a software
4. Create and conduct UML based design and analysis with the help of various diagrams.

IT1316 Data Base Management Systems + IT1317 Lab

After completion of the course students will be able to

- 1 Understand the basic fundamentals of DBMS and use different data models.
- 2 Write Structured Query Language (SQL) for given problem.



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- 3 Apply transaction strategies for concurrency and recovery of DBMS.
- 4 Design database using normalization and other techniques.
- 5 Design and build applications involving database.

IT1307 PE I: Computer Graphics

After completion of the course students will be able to

1. Understand basics of computer graphics.
2. Apply basic algorithms for line, circle and to solve, apply geometric transformation matrices including rotation, translation, scaling and reflection to transform a 2D object.
3. Analyze and evaluate specified graphics techniques of raster graphics
4. Design composite transformation matrix for 2D and 3D objects and projections and plot curve, splines.

IT1309 PE I :Embedded System

After completion of the course students will be able to

1. The concepts and architecture of embedded systems.
2. Students have knowledge about the basic structure of embedded systems
3. The concepts of realtime operating system
4. To study microcontrollers and its application.

IT1326 PE I :Digital Signal Processing

Student will able to

1. Interpret, represent and process discrete/digital signals and systems
2. To apply the concept of frequency domain analysis of discrete time signals.



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3. Ability to design & analyze DSP systems like FIR and IIR Filter etc.
4. Understanding of spectral analysis of the signals

IT1327 PE I :Web Programming

After completion of the course students will be able to

1. Understand the internet communication technologies & Web browser tools, XML application and ASP.NET.
2. Apply all the above concepts of web programming
3. Design & develop of web sites by using html and dynamic web sites by using DHTML and design JavaScript WebPages through HTML.
4. Design interactive websites & promote it online

IT1328 PE I: Data Analysis & Statistics

After completion of the course students will be able to

1. Understand fundamental concepts of data analysis using statistics.
2. Perform data analysis and Apply appropriate statistical methods in the analysis of simple datasets
3. Interpret and clearly present output from statistical analyses in a clearconcise and understandable manner
4. Define, formulate and solve problems in a systematicmanner.

IT1322 OE I: Web Technology

After completion of the course students will be able to

1. understand the internet communication technologies & Web browser tools, XML application and ASP.NET .



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2. Apply all the above concepts of web programming
3. Design & develop of web sites by using html and dynamic web sites by using DHTML and design JavaScript Webpages through HTML.
4. Design interactive websites & promote it online

IT1325 OE I: Object oriented programming (Java)

After completion of the course students will be able to

1. Demonstrate the understanding of Object oriented concepts.
2. Apply the programming language JAVA efficiently in object oriented software development
3. Able to analyze problem statement and identify appropriate objects and methods
4. Design and implement a small programs using classes

6TH SEMESTER

IT1338 Computer Networks + IT1339 Lab

After completion of the course students will be able to



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1. Understand the fundamental of Computer Network, data link layer issues, protocols, devices, and application level layer concepts.
2. Analyze different error detection mechanism in network layer.
3. Apply different routing algorithm for solving computer network Problem.
4. Analyze the performance of computer Networks and elements of transport protocol.
5. To simulate the different computer network mechanism

IT1330 Business Intelligence + IT1331 Lab

After completion of the course students will be able to

1. to understand :
 - BI as a Process, its application in various domains and functional area, its roles and responsibilities.
 - BI ecosystem and basic building blocks along with their functions in N_tier BI system,
 - Lifecycle of a BI project.
2. Apply SQL as a universal language for BI .
3. Model a business scenario, identify the metrics, indicators, various dimensions, and aggregation strategies. and make recommendations to achieve the business goal .
4. Recognize the different levels of abstraction in data warehouse, build schema objects, and generate different reports using BI tool
5. Obtain hands on experience with popular BI software for analysis, designing schema, reporting, visualization of results

IT1318 Design & Analysis of Algorithms + IT1332 Lab

After completion of the course students will be able to

1. Understand asymptotic analysis of iterative and recursive algorithms, complexity of algorithms



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2. Apply important algorithmic design techniques for problem solving
3. Analyze the performance of algorithms
4. Synthesize and design efficient algorithms for real world problems

IT1311 PE II: Artificial Intelligence

After completion of the course students will be able to

1. understand basics of AI, apply and choose proper state space search algorithm for the given problem
2. solve problems with reasoning techniques in the presence of incomplete and/or uncertain information
3. know various knowledge representation techniques
4. understand various learning methods and apply it to build simple knowledge-based systems

IT1320 PE II: Digital Image Processing

After completion of the course students will be able to

1. understand the fundamental concepts in Digital Image Processing.
2. apply knowledge of image processing algorithms and techniques to perform image enhancement and other useful image operations
3. analyze images using spatial and frequency domain techniques
4. design filters for image processing

IT1308 PE II: Mobile Communication



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After completion of the course students will be able to

1. Differentiate between wired and wireless communication and understand the basic issues related wireless & cellular communication.
2. Demonstrate Cellular system architecture and channels, based on different medium access mechanisms and to understand the basic modulation techniques to overcome the different fading effects.
3. Classify basic types of satellite communications and understand the current and proposed cellular technologies.
4. Analyze and design the traditional networks that can be extended for mobility support.

IT1333 PE II: Information Systems

After completion of the course students will be able to

1. Understand conceptual design and its functionality for MIS and ERP.
2. Apply the basic concept of MIS and ERP for implementing information system
3. Apply different planning strategies & role for implementing MIS.
4. Design MIS using Management organizational theory and different decisions.

IT1334 PE II: Internet of Things

After completion of the course students will be able to

1. Describe IoT as a Process, its architecture and Management, compare and contrast old and new challenges in IoT.
2. Apply various communication protocol and its building blocks in IoT applications.
3. Illustrate relevance of IoT with cloud and Web and analyze various security challenges and also evaluate various control strategies for the same.



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4. Create, Design and Develop various applications based on IoT concepts.

IT1336 OE II: Introduction to E-Commerce

After completion of the course students will be able to

1. Understanding of contemporary ecommerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web.
2. Defining and analyzing the concept of electronic data interchange and its legal, social and technical aspects
3. Evaluate the key aspects of B2C e-commerce and discuss the trends in e-Commerce and the use of the Internet
4. Define and analyze the security issues over the web, the available solutions, future aspects of e-commerce security, concept of E-commerce and electronic payment system.

IT1337 OE II: Information Security

After completion of the course students will be able to

1. understand the concept of information security.
2. use mechanisms like authentication, encryption and digital signature to avoid security attacks.
3. analyze the threats in networks in various layers of networks.
4. identify the need for firewalls, intrusion detection and prevention system.

IT1324 Mini Project



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After completion of the course students will be able to

1. Understand the knowledge gained from the various courses undergone in earlier years
2. Evaluate and analyze critically different sources of data available in the literature.
3. Plan complete project lifecycle, timeline and complete the design as per requirements.
4. Implement complete project in estimated time
5. Gain and apply the knowledge of tools learned and how to write Technical paper and Report in professional style, and to demonstrate the product/software to technical audience.

7TH SEMESTER

IT1403 Principle of Compiler Design + IT1404 Lab

After completion of the course students will be able to

1. Understand different phases of compilation process and lexical analyzer tool “Lex” OR “Flex”
2. Apply parsing techniques to design and implement parsers using YACC /Bison tool
3. Apply syntax directed translation scheme to programming language constructs and analyze errors in lexical and syntactic phase of compiler
4. Apply different optimization techniques in the design of compiler and generate target code

IT1417 Network Programming + IT1418 Lab

After completion of the course students will be able to



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Department of Information Technology

1. Understand the basics of TCP/IP model and IP Addressing scheme and design IP scheme for a given network and its packages and operation
2. Understand the working of network layer protocols and concept of Socket Programming and its functions.
3. Apply knowledge of socket programming to develop network based application.
4. Understand interprocess communication in Unix.

IT1427 Data Mining + IT1428 Lab

After completion of the course students will be able to

1. Understand basic concepts in data mining, Identify the scope and necessity of Data Mining for the society and for business applications.
2. Apply different data mining algorithms on given data set.
3. Analyze alternative data mining implementations and what might be most appropriate for a given data mining task.
4. Develop algorithm for mining application specific data.
5. Use popular data mining tool and apply the principle algorithms and techniques used in data mining, on different types of dataset, analyze their results, interpret the results using different visualization techniques.

IT1422 Network Security

After completion of the course students will be able to



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Department of Information Technology

1. Analyze the vulnerabilities in any computing system and hence be able to design a security solution.
2. Identify the security issues in the network and resolve it.
3. Evaluate security mechanisms using rigorous approaches,
4. Compare different standards and electronic mail security

IT1407 PE III: Real Time Systems

After completion of the course students will be able to

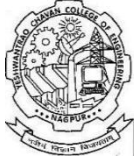
1. Enumerate the need and the challenges in the design of hard and soft real time systems.
2. Compare different scheduling algorithms and the schedulability criteria.
3. Determine schedulability of a set of periodic tasks given a scheduling algorithm.
4. Develop algorithms to decide the admission criterion of sporadic jobs and the schedule of aperiodic jobs.
5. Integrate resource access mechanisms with the scheduling techniques and develop integrated schedulability criteria.

IT1423 PE III: Human Computer Interaction

After completion of the course students will be able to

1. Explain the human components functions regarding interaction with computer
2. Explain Computer components functions regarding interaction with human
3. Demonstrate Understanding of Interaction between the human and computer components.
4. Will be able to design a user interface with understanding & application of Designing rules.

IT1430 PE III: E-Commerce



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Department of Information Technology

After completion of the course students will be able to

5. Understanding of contemporary ecommerce concepts and terminology, and the processes and management decisions that are involved in launching, operating and managing business activity on the World Wide Web.
6. Defining and analyzing the concept of electronic data interchange and its legal, social and technical aspects
7. Evaluate the key aspects of B2C e-commerce and discuss the trends in e-Commerce and the use of the Internet
8. Define and analyze the security issues over the web, the available solutions, future aspects of e-commerce security, concept of E-commerce and electronic payment system.

IT1432 PE III: Cloud Computing

After completion of the course students will be able to

1. Understand the different computing paradigm, analyze and apply cloud computing services, deployment model for building cloud
2. Apply the concepts and techniques in cloud computing
3. Analyze the problems and apply design considerations for cloud application
4. Provide the appropriate cloud computing solutions for building cloud application

IT1436 PE III: Coding Standard and Technical Documentation

After completion of the course students will be able to

1. To be able to write standard codes for Java Programming Language in a manner that increases readability and understandability and Acquire the fine art of documenting Java code



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2. Practice the unique qualities of professional writing style, including sentence conciseness, readability, clarity, accuracy, avoiding wordiness or ambiguity, previewing and objectivity.
3. Collect, analyze, document, and report research clearly, concisely, logically, and ethically.

IT1415 PE IV : Neural Networks & Fuzzy Logic + IT1416 Lab

After completion of the course students will be able to

1. understand the mathematical foundations and working of neural networks as pattern classifier
2. comprehend the neural networks as means for computational learning and to analyze the basic network architectures and algorithms for supervised and unsupervised learning
3. understand the basics of fuzzy sets, its operations and the need for fuzzy logic
4. Design fuzzy inference system and to design a fuzzy controller

IT1405 PE IV: Pattern Recognition + IT1439 Lab

After completion of the course students will be able to

1. Understand the fundamentals of pattern recognition, design cycle, application and Analyze classification problems probabilistically and estimate classifier performance.
2. Demonstrate the principles of Bayesian parameter estimation and apply them in relatively simple probabilistic models.
3. Illustrate and analyze methods of classification techniques, and choose a appropriate decision making technique to solve a problem.
4. Select and apply appropriate clustering method for solving the given problem, and design and develop Nets with & without Hidden Layers, Back-Propagation Algorithm, and Hopfield Nets.



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IT1421 PE IV: Distributed Systems + IT1440 Lab

After completion of the course students will be able to

1. Identify the advantages and challenges in designing distributed algorithms for different primitives like mutual exclusion, deadlock detection, agreement, etc.
2. Design and develop distributed programs using sockets and RPC/RMI.
3. Differentiate between different types of faults and fault handling techniques in order to implement fault tolerant systems.
4. Analyze different algorithms and techniques for the design and development of distributed systems subject to specific design and performance constrain

8TH SEMESTER

IT1424 Industrial Project (Industry Visit / Training / Seminar)

Internship

After completion of the course students will be able to

1. Acquire the any recent technological skills for his development.
2. Apply the technical knowledge in various real time problem and develop the application with industry support and write a report.
3. Have ability to represent his candidature for employment or become a future employers.



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IT1425 Comprehensive Viva-Voce

After completion of the course students will be able to

1. Understanding of various courses
2. preparedness to tackle unknown problems
3. studentsability to think in time pressure
4. presentation skills

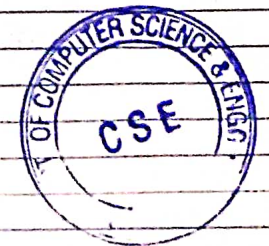
Computer Science & Engineering

Department of Computer Science & Engineering
Course Outcomes (Session 2021-2022)

Sr. No.	Sem	Course Code	Subject	Course Outcomes
1	3	GE2201	Engineering Mathematics III	<p>Estimate the Calculus of Numerical Function and Solve difference equations</p> <p>Determine the transforms and inverse transforms of various functions and Apply it to solve Mathematical equations.</p> <p>Discuss the periodicity of functions and express it in terms of Fourier series.</p> <p>Solve partial differential equations.</p>
2	3	CSE2201	Computer Architecture & Organization	<p>Understand and demonstrate the basic Computer architecture concepts related to the working of processors, memory systems, and input/output systems.</p> <p>Differentiate among various addressing modes and develop ability to write assembly language programs.</p> <p>Comprehend information representation in computer and perform arithmetic operations using algorithms suitable for hardware implementation.</p> <p>Explain and compare techniques for improving the performance of a computer system components like CPU, main memory, input/output system and pipelining.</p>
3	3	CSE2202/ CSE2203	Object Oriented Programming and Lab	<p>Demonstrate the understanding of Object oriented concepts.</p> <p>Analyze problem statement and identify appropriate objects and methods for problem solving.</p> <p>Make use of predefined classes and frameworks for reducing coding efforts and improving performance.</p> <p>Apply features of object oriented programming to write programs to solve real world problems.</p>
4	3	CSE2204/ CSE2205	Data Structures I and Lab	<p>To review programming concepts and understand fundamental concepts in data structures.</p> <p>To apply and analyze algorithms for performing operations on data structures</p> <p>To Evaluate the performance of data structures and its applications.</p> <p>Simulate the algorithms for performing operations on data structures.</p>
5	3	CSE2206	Software Lab-I	<p>Understand the basic data types, built in data structures, control statements and loops and write simple programs in Python</p> <p>To understand the concepts of functions modules and packages and write complex programs using them.</p> <p>To understand defining and handling Python objects and develop classes</p> <p>To develop a useful application in Python</p>
1	4	GE2207	Discrete Mathematics & Graph Theory	<p>Apply the basic concept of classical sets, mathematical logic and fuzzy sets.</p> <p>Discuss the nature of Relations and Functions.</p> <p>Identify the nature of different algebraic structures such as Group, Ring and Field.</p> <p>Construct graphs and minimal spanning trees.</p>
2	4	CSE2251/CSE2252	Operating Systems and Lab	<p>Understand the fundamental concepts in Operating Systems (OS) and understand how Various hardware features support OS functionality.</p> <p>Explain various OS mechanisms and policies for managing system resources</p> <p>Analyze algorithms and techniques for managing various OS resources in a Multiprogramming and other environments.</p> <p>Simulate and evaluate algorithms/techniques for managing various OS resources</p>
3	4	CSE2253/ CSE2254	Data Structures II and Lab	<p>Create and manipulate various data structures like linked list, disjoint sets, trees, graph for real world problem.</p> <p>Apply appropriate data structure for implementation of real world applications</p> <p>Analyze the performance of operations performed on data structures.</p> <p>Design application by using data structures for real world problems.</p>
4	4	CSE2255/ CSE2256	Introduction to Data Analysis and Lab	<p>Understand fundamental concepts of statistics and probability for data analysis</p> <p>Apply appropriate statistical methods on simple datasets</p> <p>Formulate and solve problems in a systematic manner</p> <p>Conduct investigation and Interpret output obtained from statistical analysis on datasets</p> <p>Obtain hands-on experience with some popular software (like R) for analysis and visualization of data</p>



5	4	CSE2257	Theory of Computation	<p>Apply basic properties of formal languages and to design finite automata for regular expression and Regular Grammar</p> <p>Construct context free grammar for various languages.</p> <p>Solve various problems of push down automata for context free languages.</p> <p>Design Turing Machines for given any computational problem.</p>
1	5	CSE2301/ CSE2302	Database Management Systems and Lab	<p>Understand & compare different levels of abstraction & data independence</p> <p>Design Entity Relationship Diagram for any scenario & normalize the database</p> <p>Solve queries based on relational algebra & SQL</p> <p>Analyze transaction management, various concurrency control protocols and crash recovery methods</p>
2	5	CSE2303/ CSE2304	Design and Analysis of Algorithms and Lab	<p>Remember the concepts of algorithms,</p> <p>Understand time requirements of an algorithm and mathematical techniques used in analysis of algorithms</p> <p>Analyze the Complexities of different algorithms for a wide variety of foundational problems occurring in computer science applicat</p> <p>Apply the knowledge of different algorithms with discussions on complexity.</p> <p>Evaluate the knowledge of algorithms with Complexity and NP-completeness</p>
3	5	CSE2311/ CSE2312	PE I: Business Intelligence and Lab	<p>Apply the knowledge of basic concepts of Business Intelligence and multidimensional modelling and able to compare digital data type</p> <p>Build and operate the multidimensional data model for the specific scenario to extract the information</p> <p>Analyze the business information to construct the reports from it</p> <p>Decide the mode / channel to implement the business intelligence solution for the specific problem</p>
4	5	CSE2313/ CSE2314	PE I: Web Technologies and Lab	<p>Design Web pages using HTML5, CSS3</p> <p>Perform various operations using AJAX</p> <p>Use features of Client side programming</p> <p>Develop Web pages using JavaScript</p>
5	5	CSE 2317/ CSE 2318	PE I: Mobile Programming and Lab	<p>Understand the basics of mobile programming</p> <p>Apply mobile programming concepts</p> <p>Design user interfaces</p> <p>Design mobile database</p> <p>Analyse inter - application communication</p>
6	5	CSE2331	OE I Database System Essentials	<p>Understand the basics concepts of Database System and its modelling, compare SQL and NoSQL databases.</p> <p>Solve queries based on SQL, and procedures using PL-SQL, &amp; Analyse data dependencies &amp; Normalization</p> <p>Understand Query Processing and evaluate queries</p> <p>Understand ACID Properties and database system Architecture</p>
7	5	CSE2332	OEI-Introduction to Image Processing	<p>Understand basic principles of image processing</p> <p>Analyze images using processing algorithms/Techniques</p> <p>Apply the concepts to implements basic image processing algorithms/operations</p>
8	5	CSE2342	OE I-Introduction to Cloud Computing	<p>Describe the concepts and models of cloud computing</p> <p>Understand Cloud Services and Platforms</p> <p>Compare different Cloud tools</p> <p>Recall the key features pertaining to Cloud Application Design & Security</p>
9	5	CSE2343	OE I-Introduction to Web Technologies	<p>Design Web pages using HTML5</p> <p>Build an interactive website with CSS3</p>



First Year

First year
Department of Applied Chemistry


Course Outcomes (CO)

Name of the course: **Engineering Chemistry (Theory & Practical)**

Course code: **GE2103, GE2104**

2021-2022 Sem I+ II

PO	Unit	Expt. No.	CO	Statement of Course Outcomes
The students will be able to:				
PO1 PO2	I	9,10	CO-1	Illustrate qualitative and quantitative aspects of water for industrial and domestic applications. (L2)
PO1	II, III	-	CO-2	Apply the knowledge of basic electrochemistry to know battery technology, corrosion process and preventive techniques. (L3)
PO1 PO2 PO7	IV, V	5,7,8	CO-3	Identify analytical aspects of industrial materials like fuels and lubricants for efficient utilization. (L1)
PO1 PO7	VI	4	CO-4	Recognize the significance of cement and advanced engineering materials in technological applications. (L1)
PO1 PO2 PO7		all	CO-5	Develop analytical and instrumental skills. (L3)



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First year
Department of Applied Chemistry

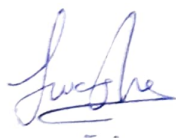
Program Outcomes (PO)

Name of the course: **Engineering Chemistry (Theory & Practical)**

Course code: **GE2103, GE2104**

2021-2022 Sem I+ II

Program outcome	Statement of Program Outcomes
PO-1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO-7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



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Name of the course: **Engineering Chemistry (Theory & Practical)**

Course code: **GE2103, GE2104**

2021-2022 Sem I + II

CO-PO Matrix

UNIT	Experiment no	CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I	9,10	CO1	3	2					2					
II, III	-	CO2	3											
IV, V	5,7,8	CO3	3	2					2					
VI	4	CO4	3						2					
	all	CO5	3	3					3					
			3	2.33					2.25					

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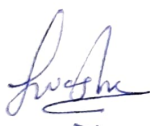
Name of the course: **Engineering Chemistry (Theory & Practical)**

Course code: **GE2103, GE2104**

2021-2022 Sem I + II

Attainment level and Benchmark

Benchmark > 40%	
Attainment level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)



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Department of Applied Chemistry

Course Outcomes (CO)

Name of the course: Applied Chemistry (Theory & Practical)

Course code: AIDS-2102

2021-2022 Sem I

PO	Unit	Expt. No.	CO	Statement of Course Outcomes
The students will be able to:				
PO1 PO2 PO7	I		CO-1	Interpret different thermodynamic functions. (L2).
PO1 PO2 PO7	II, III	9,10	CO-2	Describe basic concepts of electrochemistry and apply the knowledge for energy storage devices. (L3)
PO1 PO2	IV,V	13	CO-3	Illustrate chemical reaction rate and drug molecules synthesis. (L3)
PO1 PO7	VI		CO-4	Classify advanced engineering materials in technological applications. (L2)
PO1 PO2 PO7		ALL	CO-5	Develop analytical and instrumental skills. (L3)



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Program Outcomes (PO)

Name of the course: **Engineering Chemistry (Theory & Practical)**

Course code: **AIDS-2102**

2021-2022 Sem I

Program outcome	Statement of Program Outcomes
PO-1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO-7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



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Name of the course: Engineering Chemistry (Theory & Practical)

Course code: AIDS-2102

2021-2022

Sem I

CO-PO Matrix

UNIT	Experiment no	CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I		CO1	3	2					1					
II,III	9,10	CO2	3	1					1					
IV,V	13	CO3	2	2										
VI		CO4	3						2					
V	ALL	CO5	3	2					2					
			2.8	1.75					1.5					

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Name of the course: **Engineering Chemistry (Theory & Practical)**

Course code: **AIDS-2102**

2021-2022 Sem I

Attainment level and Benchmark

Benchmark > 40%	
Attainment level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)



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Course Outcomes (CO)

Name of the course: Applied Chemistry (Theory & Practical)

Course code: AIML-2107

2021-2022 Sem I

PO	Unit	Expt. No.	CO	Statement of Course Outcomes
The students will be able to:				
PO1 PO2 PO7	I		CO-1	Interpret different thermodynamic functions. (L2).
PO1 PO2 PO7	II, III	9,10	CO-2	Describe basic concepts of electrochemistry and apply the knowledge for energy storage devices. (L3)
PO1 PO2	IV	13	CO-3	Illustrate chemical reaction rate and types of reactions. (L3)
PO1 PO7	VI		CO-4	Classify advanced engineering materials in technological applications. (L2)
PO1 PO2 PO7	V	ALL	CO-5	Develop analytical and instrumental skills. (L3)



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Program Outcomes (PO)

Name of the course: Applied Chemistry (Theory & Practical)

Course code: AIML-2107

2021-2022 Sem I

Program outcome	Statement of Program Outcomes
PO-1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO-2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO-7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.



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Department of Applied Chemistry
Name of the course: Applied Chemistry (Theory & Practical)

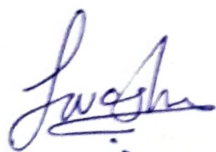
Course code: AIML-2107

2021-2022

Sem I

CO-PO Matrix

UNIT	Experiment no	CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
I		CO1	3	2					1					
II,III	9,10	CO2	3	1					1					
IV,V	13	CO3	2	2										
VI		CO4	3						2					
	ALL	CO5	3	2					2					
			2.8	1.75					1.5					



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Department of Applied Chemistry

Name of the course: Applied Chemistry (Theory & Practical)

Course code: AIML-2107

2021-2022 Sem I

Attainment level and Benchmark

Benchmark > 40%	
Attainment level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)



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Ph.: 07104-237919, 234623, 329249, 329250 Fax: 07104-232376, Website: www.ycce.edu

Department of Applied Chemistry
2021-22

CO-PO Mapping
Course name-- Applied Chemistry
Course code- IIOT-2152

PO	Unit	Expt. No.	CO	Statement of Course Outcomes IIOT
The students will be able to:				
PO1 PO2 PO7	I & IV		CO-1	Interpret different thermodynamic functions and chemical reaction rates .
PO1 PO2 PO7	II, III	9,10	CO-2	Describe basic concepts of electrochemistry and apply the knowledge for energy storage devices.
PO1 PO2	v	13	CO-3	Develop better awareness about global environmental concerns.
PO1 PO7	VI		CO-4	Classify advanced engineering materials in technological applications.
PO1 PO2 PO7		1 TO 13	CO-5	Develop analytical and instrumental skills.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2					1							
CO 2	3	1					1							
CO 3	2	2					1							
CO 4	3						2							
CO 5	3	2					2							

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Department of Applied Chemistry

2021-22

CO-PO Mapping

Course name-- Applied Chemistry
Course code- CSD-2152

PO	Unit	Expt. No.	CO	Statement of Course Outcomes CSD
The students will be able to:				
PO1 PO2 PO7	I		CO-1	Interpret different thermodynamic functions.
PO1 PO2 PO7	II, III	9,10	CO-2	Describe basic concepts of electrochemistry and apply the knowledge for energy storage devices.
PO1 PO2	IV,V	13	CO-3	Illustrate chemical reaction rate and drug molecules synthesis.
PO1 PO7	VI		CO-4	Classify advanced engineering materials in technological applications.
PO1 PO2 PO7		1 TO 13	CO-5	Develop analytical and instrumental skills.

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	3	2					1							
CO 2	3	1					1							
CO 3	2	2					2							
CO 4	3						2							
CO 5	3	2												

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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

1) Course Title: Engineering Mathematics-I (GE 2101)

Course Outcome	Statement of Course Outcome	LEVEL
	Students will be able to	
CO-1	Calculate the higher order derivatives, Express functions in series form and able to compute radius and Circle of curvature.	L3
CO-2	Determine derivatives of functions of Multiple variables, Express function of multiple variables in series and compute the extreme values of functions.	L3
CO-3	Solve the integral functions of single and multiple variables, Trace a Cartesian curve and determine dimensions of geometrical figures.	L3
CO-4	Discuss Calculus of Scalar and vector point function and apply appropriate theorems to solve integrals of functions of single, multiple variables.	L3

Articulation Matrix

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	L3	L3										
CO-2	L3	L3										
CO-3	L3	L3	L3									
CO-4	L3	L3										

[Signature]
Head, Department of Applied
Mathematics and Humanities
Yeshwantrao Chavan College
of Engineering, Nagpur



Department of Applied Mathematics & Humanities


Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

2) Course Title: Engineering Mathematics-II (GE 2102)

Course Outcome	Statement of Course Outcome	LEVEL
	Students will be able to	
CO-1	Solve first order and higher order differential equations and apply it to find solutions of engineering problems	L3
CO-2	Solve problems on complex numbers, complex variables and apply appropriate methods / theorems to solve complex integrals.	L3
CO-3	Apply Matrix method to solve linear equations and differential equations, determine Eigen values - Eigen vectors and apply appropriate theorems to solve matrix equations.	L3
CO-4	Calculate the statistical parameters and develop an equations of best fit curves.	L3

Articulation Matrix

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	L3	L3	L3									
CO-2	L3	L3										
CO-3	L3	L3										
CO-4	L3	L3	L3									


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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

3) Course Name: Calculus, Sequence and series (AIDS 2101/ AIML 2101 / CSD2101)

Course Outcome	Statement of Course Outcome	LEVEL
	Students will be able to	
CO-1	Apply the knowledge of differentiation, sequence and series to solve engineering problems.	L3
CO-2	Determine the expansion and derivatives of functions of several variables and use it to find extreme values of functions.	L3
CO-3	Evaluate the improper integrals, multiple integrals and apply it to compute the area and volume of various structures.	L3
CO-4	Solve higher order differential equations and its applications.	L3

Articulation Matrix

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	L3	L3										
CO-2	L3	L3										
CO-3	L3	L3	L3									
CO-4	L3	L3	L3									

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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

4) Course Name: Calculus (IOT2101)

Course Outcome	Statement of Course Outcome	LEVEL
	Students will be able to	
CO-1	Apply the knowledge of differentiation, limit and continuity to develop the Mathematical concepts to solve engineering problems	L3
CO-2	Determine the expansion and derivatives of functions of Multiple variables and use it to find extreme values of functions	L3
CO-3	Evaluate the improper integrals, multiple integrals and apply it to compute the area and volume of various structures.	L3
CO-4	Solve higher order differential equations and its applications..	L3

Articulation Matrix

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	L3	L3										
CO-2	L3	L3										
CO-3	L3	L3	L3									
CO-4	L3	L3	L3									

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of Engineering, Nagpur



Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

5) Course Name: Probability and Statistics (AIDS2151/ AIML2151/CSD2151)

Course Outcome	Statement of Course Outcome	LEVEL
	Students will be able to	
CO-1	Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities.	L2
CO-2	Make use of probability distributions to solve real life problems	L2
CO-3	Apply concepts of sampling theory to find probabilities and estimates parameters of various problems.	L3
CO-4	Inspect scientific data, use proper curve fitting and find correlation, regression of variables.	L3

Articulation Matrix

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1	L2	L2										
CO-2	L2	L2										
CO-3	L3	L3										
CO-4	L3	L3										

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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

6) Probability Theory and Statistical Inference (IOT2151)

Course Outcome	Statement of Course Outcome	LEVEL
	Students will be able to	
CO-1	Identify an appropriate probability distribution for a given discrete or continuous random variable and compute probabilities.	L2
CO-2	Make use of probability distributions to solve a given problem.	L2
CO-3	Apply concepts of sampling theory to find probabilities and estimates parameters of various problems.	L3
CO-4	Test the hypothesis and estimate confidence intervals at different levels.	L3

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1	L2	L2												
CO 2	L2	L2												
CO 3	L3	L3	L3											
CO 4	L3	L3	L3											

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Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

7) Course Title : Communication Skill (GE 2107)

Course Outcome	Statement	LEVEL
	Students will be able to	
CO 1	Explain the basic concepts of communication process and to identify and overcome the barriers in communication.	L3
CO 2	Distinguish and use the speech sounds of English Language.	L2
CO 3	Plan and Apply different strategies and techniques of presentations , Interview techniques and group Communication.	L3
CO 4	Draft reports , memos and emails, considering the professional etiquettes and ethics appropriate to various content and context.	L2

Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO-1									L3	L2				
CO-2										L2				
CO-3										L2				
CO-4									L2	L2				

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Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

8) Course Title: SOCIAL SCIENCE (GE2108)

Course Outcome	Statement of Course Outcome	Blooms Level
	Students will be able to	
CO-1	Explain the basic concepts of Social Sciences.	L2
CO-2	Describe the development of various Civilizations and their Culture.	L2
CO-3	Analyze the Impact of Industrialization on society and discuss the Fundamental Concepts of Society.	L4
CO-4	Explain Industrial Organization and Management.	L2

Articulation Matrix

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
CO-1						L2						L2
CO-2						L2						
CO-3						L4						
CO-4						L2					L2	

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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

9) Course Name: Technical Communication (AIDS2104/ AIML2102/ CSD2154/IIOT2156)

Course Outcome	Statement	LEVEL
	Students will be able to	
CO 1	Apply different modes for effective communication	L3
CO 2	Competently use the phonology of English language	L2
CO 3	Apply nuances of LSRW skills	L3
CO 4	Communicate through different channels	L2

Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO-1	PSO-2
CO-1									L3	L2				
CO-2										L2				
CO-3										L3				
CO-4									L2	L2				

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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

10) Constitution Of India (AIDS2154/AIML2159/ CSD2104/ IOT2103)

Course Outcome	Statement	LEVEL
	Students will be able to	
CO 1	Explain the basic concepts of Constitution of India..	L3
CO 2	Describe the various Fundamental rights	L2
CO 3	Analyze the Impact of federalism on the State	L3
CO 4	Explain Industrial Law and Judiciary	L3

Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1								L3				L3		
CO 2												L2		
CO 3						L3						L3		
CO 4									L3					

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Department of Applied Mathematics & Humanities

Redefined Course Outcomes of courses in Department of Applied Mathematics and Humanities:

11) Universal Human Values (GE2131)

Course Outcome	Statement	LEVEL
	Students will be able to	
CO 1	Experiential validation through the way to verify right or wrong.	L2
CO 2	Practice living in harmony with natural acceptance	L2
CO 3	Realise the importance of relationships.	L1
CO 4	Recognize the importance of sustainable co-existence in existence	L1

Articulation Matrix

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1								L2				L2		
CO 2							L2					L2		
CO 3									L1	L1		L1		
CO 4							L1			L1		L1		

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 Yashwantrao Chavan College of Engineering, Nagour



Department of Applied Physics

B. Tech. (CSE AIML)

Course Code: AIML2152 /AIML-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

Course Outcomes

PO	Unit-No.	Expt.No.	Course Outcomes	Statement of Course outcomes
				Students are able to
PO1,PO2	3	1,3,4,7,10	CO 2	Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
PO1,PO2	4	6,8,9,11	CO 3	Illustrate working principle of lasers and optical fibres for their use in the field of industry.
PO1,PO2	5	12	CO 4	Identify the requirements of sensor material for technological application.
PO1,PO2	6	2,5	CO 5	Analyze the motion in electric field and magnetic field and its applications to electron optic devices.

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Department of Applied Physics

B. Tech. (CSE AIML)

Course Code: AIML2152 /AIML-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

Program Outcomes	Statement of the Program Outcomes
	At the end of Program, students will be able to
PO1	Apply the knowledge of mathematics, science to the solution of complex engineering problems.
PO2	Identify, formulate, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences.

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Department of Applied Physics

B. Tech. (CSE AIML)

Course Code: AIML2152 /AIML-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

CO-PO Matrix

Unit- No.	Expt. No.	CO	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
		CO 1	2	2	-	-	-	-	-	-	-	-	-	-
3	1,3,4, 7,10	CO 2	2	2	-	-	-	-	-	-	-	-	-	-
4	6,8,9,11	CO 3	2	2	-	-	-	-	-	-	-	-	-	-
5	12	CO 4	2	2	-	-	-	-	-	-	-	-	-	-
6	2,5	CO 5	3	3	-	-	-	-	-	-	-	-	-	-
			2.2	2.2										

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Department of Applied Physics

B. Tech. (CSE AIML)

Course Code: AIML2152 /AIML-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

Attainment Level & Benchmark

Benchmark > 40%	
Attainment Level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)

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Department of Applied Physics

B. Tech. (AI-DS)

Course Code: AIDS2152 /AIDS-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

Course Outcomes

PO	Unit-No.	Expt.No.	Course Outcomes	Statement of Course outcomes
				Students are able to
PO1,PO2	2	1,3,4,7,10	CO 2	Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
PO1,PO2	3,4	6,8,9,11,12	CO 3	Illustrate working principle of lasers and optical fibres for their use in the field of industry.
PO1,PO2	5	2,5	CO 4	Analyze the motion in electric field and magnetic field and its applications to electron optic devices.

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Department of Applied Physics

B. Tech. (AI-DS)

Course Code: AIDS2152 /AIDS-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

Program Outcomes	Statement of the Program Outcomes
	At the end of Program, students will be able to
PO1	Apply the knowledge of mathematics, science to the solution of complex engineering problems.
PO2	Identify, formulate, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences.

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Department of Applied Physics

B. Tech. (AI-DS)

Course Code: AIDS2152 /AIDS-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

CO-PO Matrix

Unit- No	Expt. No..	CO	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
		CO 1	2	2	-	-	-	-	-	-	-	-	-	-
2	1,3,4,5,8,1 0,11	CO 2	2	2	-	-	-	-	-	-	-	-	-	-
3,4	6,8,9,11,12	CO 3	3	3	-	-	-	-	-	-	-	-	-	-
5	2,5	CO 4	3	3	-	-	-	-	-	-	-	-	-	-
		CO 5	2	2	-	-	-	-	-	-	-	-	-	-
			2.4	2.4										

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Department of Applied Physics

B. Tech. (AI-DS)

Course Code: AIDS2152 /AIDS-2153

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: II

Attainment Level & Benchmark

Benchmark > 40%	
Attainment Level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)

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Department of Applied Physics

B. Tech. (IIOT)

Course Code: IIOT2105 / IIOT2106

Course Name: Semiconductor Physics (Theory & Practical)

Session: 2021-22

Sem: I

Course Outcomes

PO	Unit-No.	Expt. No.	Course Outcomes	Statement of Course outcomes
				Students are able to
PO1,PO2	3	1,3,4,5,8,10,11	CO 2	Justify the characteristics of semiconductor materials in terms of crystal structures, chargecarriers and energy bands.
PO1,PO2	4	12	CO 3	Identify the requirements of sensor material for technological application.
PO1,PO2	5	7,9	CO 4	Illustrate optical interactions associated with semiconductor materials for their use in the devices.
PO1,PO2	6	2,6	CO5	Analyze the electron motion in electric and magnetic field contributing to electronic display devices.

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Department of Applied Physics

B. Tech. (IIOT)

Course Code: IIOT2105 / IIOT2106

Course Name: Semiconductor Physics (Theory & Practical)

Session: 2021-22

Sem: I

Program Outcomes	Statement of the Program Outcomes
	At the end of Program, students will be able to
PO1	Apply the knowledge of mathematics, science to the solution of complex engineering problems.
PO2	Identify, formulate, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences.

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Department of Applied Physics

B. Tech. (IOT)

Course Code: IOT2105 / IOT2106

Course Name: Semiconductor Physics (Theory & Practical)

Session: 2021-22

Sem: I

CO-PO Matrix

Unit-No	Expt. No..	CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
		CO1	2	2	-	-	-	-	-	-	-	-	-	-
3	1,3,4,5,8,10,11	CO2	2	2	-	-	-	-	-	-	-	-	-	-
4	12	CO3	2	2	-	-	-	-	-	-	-	-	-	-
5	7,9	CO4	3	3	-	-	-	-	-	-	-	-	-	-
6	2,6	CO5	3	3	-	-	-	-	-	-	-	-	-	-
			2.4	2.4										

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Department of Applied Physics

B. Tech. (IIOT)

Course Code: IIOT2105 / IIOT2106

Course Name: Semiconductor Physics (Theory & Practical)

Session: 2021-22

Sem: I

Attainment Level & Benchmark

Benchmark > 40%	
Attainment Level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)

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Department of Applied Physics

B. Tech. (CSD)

Course Code: CSD2102/ CSD2103

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: I

Course Outcomes

PO	Unit-No.	Expt. No.	Course Outcomes	Statement of Course outcomes
				Students are able to
PO1,PO2	2	5	CO 2	Analyze crystal structures in terms of lattice parameters with identification of crystal planes.
PO1,PO2	3	1,3,4,8,11	CO 3	Assess the characteristics of semiconductor materials in terms of crystal structures, charge carriers and energy bands.
PO1,PO2	4,5	7,9,10,12	CO 4	Illustrate working principle of lasers and optical fibres for their use in the field of industry.
PO1,PO2	6	2,6	CO5	Analyze the motion in electric field and magnetic field and its applications to electron optic devices.

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Department of Applied Physics

B. Tech. (CSD)

Course Code: CSD2102/ CSD2103

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: I

Program Outcomes	Statement of the Program Outcomes
	At the end of Program, students will be able to
PO1	Apply the knowledge of mathematics, science to the solution of complex engineering problems.
PO2	Identify, formulate, and analyze complex engineering problems reaching substantiated conclusions using principles of mathematics, natural sciences.

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B. Tech. (CSD)

Course Code: CSD2102/ CSD2103

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: I

CO-PO Matrix

Unit- No	Expt. No..	CO	PO1	PO2	PO 3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
		CO 1	2	2	-	-	-	-	-	-	-	-	-	-
2	5	CO 2	2	2	-	-	-	-	-	-	-	-	-	-
3	1,3,4,8,11	CO 3	2	2	-	-	-	-	-	-	-	-	-	-
4,5	7,9,10,12	CO 4	3	3	-	-	-	-	-	-	-	-	-	-
6	2,6	CO 5	3	3	-	-	-	-	-	-	-	-	-	-
			2.4	2.4										

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B. Tech. (CSD)

Course Code: CSD2102/ CSD2103

Course Name: Applied Physics (Theory & Practical)

Session: 2021-22

Sem: I

Attainment Level & Benchmark

Benchmark > 40%	
Attainment Level	Category
1	Low (50-60%)
2	Medium (61-70%)
3	High (>70%)

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