P.E.S. College of Engineering, Nagsenvan, Chh. Sambhajinagar

Department of Mechnical & Automation Engineering

PO ,PSO & CO (Yearwise) 2023-2024

P.E.S. College of Engineering * Mechanical Department *

SECOND YEAR
SEM III

- **Subject Name: Fluid Mechanics BTMC302**

  - Course Outcomes:

1. Define fluid, define and calculate various properties of fluid
2. Calculate hydrostatic forces on the plane and curved surfaces and explain stability of floating bodies
3. Explain various types of flow. Calculate acceleration of fluid particles
4. Apply Bernoulli's equation to simple problems in fluid mechanics
5. Explain laminar and turbulent flows on flat plates and through pipes
6. Explain and use dimensional analysis to simple problems in fluid mechanics
7. Understand centrifugal pump.

- **Subject Name: Thermodynamics BTMC303**

  - Course Outcomes:

1. Define the terms like system, boundary, properties, equilibrium, work, heat, ideal gas, entropy etc. used in thermodynamics.
2. Studied different laws of thermodynamics and apply these to simple thermal systems to study energy balance.
3. Studied Entropy, application and disorder.
4. Studied various types of processes like isothermal, adiabatic, etc. considering system with ideal gas and represent them on p-v and T-s planes.
5. Represent phase diagram of pure substance (steam) on different thermodynamic planes like p-v, T-s, h-s, etc. Show various constant property lines on them.

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- **Subject Name: Material Science and Metallurgy BTMES304**

  - Course Outcomes:

1. Study various crystal structures of materials.
2. Understand mechanical properties of materials and calculations of same using appropriate equations.
3. Evaluate phase diagrams of various materials.
4. Suggest appropriate heat treatment process for a given application.
5. Prepare samples of different materials for metallography.
6. Recommend appropriate NDT technique for a given application.

- **Subject Name: Machine Drawing and CAD Lab BTMCL305**

  - Course Outcomes:

1. Interpret the object with the help of given sectional and orthographic views.
2. Construct the curve of intersection of two solids.
3. Draw machine element using keys, cotter, knuckle, bolted and welded joint.
4. Assemble details of any given part. i. e. valve, pump, machine tool part etc.
5. Represent tolerances and level of surface finish on production drawings.
6. Understand various creating and editing commands in Auto Cad.

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Semester IV

- **Subject Name: Introduction to Automation**

- Course Outcomes:

1. Understand and learn about fundamentals of automation systems.
2. Understand and learn Architecture of Automation Systems.
3. Understand and learn sensing and auction of automation systems.
4. Understand and learn advanced tolls used in automation systems.

Subject Name: Basic Human Rights

Course Outcomes:

1. Understand the history of human rights.
2. Learn to respect others caste, religion, region and culture.
3. Be aware of their rights as Indian citizen.
4. Understand the importance of groups and communities in the society.
5. Realize the philosophical and cultural basis and historical perspectives of human rights.
6. Make them aware of their responsibilities towards the nation.

Subject Name: Strength of Materials

- Course Outcomes:

1. State the basic definitions of fundamental terms such as axial load, eccentric load, stress, strain, E, μ, etc.
2. Recognize the stress state (tension, compression, bending, shear, etc.) and calculate the value of stress developed in the component in axial/eccentric static and impact load cases.
3. Distinguish between uniaxial and multiaxial stress situation and calculate principal stresses, max. Shear stress, their planes and max. Normal and shear stresses on a given plane.

4. Analyze given beam for calculations of SF and BM
5. Calculate slope and deflection at a point on cantilever /simply supported beam using double integration, Macaulay's , Area-moment and superposition methods

Subject Name: Numerical Methods in Mechanical Engineering

- Course Outcomes:

1. Describe the concept of error
2. Illustrate the concept of various Numerical Techniques
3. Evaluate the given Engineering problem using the suitable Numerical Technique
4. Develop the computer programming based on the Numerical Technique

Subject Name: Electrical Drives and Control

- Course Outcomes:

1. Recognize common manufacturing processes of Sheet Metal Fabrication
2. Understand the principles of design and fabricate of sheet metal products and recognize common material used in the industry
3. Distinguish Shearing, Drawing and Pressing etc. processes.
4. Know types of dies and formability.
5. Select mechanical or hydraulic presses for the given process

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Third Year
Semester - V

Program Outcomes

At the end of the program the student will be able to:

- PO 1: Apply the knowledge of mathematics, basic sciences, and mechanical engineering to the solution of complex engineering problems.
- PO 2: Identify, formulate, research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions.
- PO 3: Design solutions for complex engineering problems and design mechanical system components that meet the specified needs.
- PO 4: Use mechanical engineering research-based knowledge related to interpretation of data and provides valid conclusions.
- PO 5: Create, select, and apply modern mechanical engineering and IT tools to complex engineering activities with an understanding of the limitations.
- PO 6: Apply reasoning acquired by the mechanical engineering knowledge to assess societal and safety issues.
- PO 7: Understand the impact of engineering solutions on the environment, and demonstrate the knowledge for sustainable development.
- PO 8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- PO 9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- PO 10 :Communicate effectively on complex engineering activities with the engineering community and with society at large.
- PO 11: Understand the engineering and management principles and apply these to the multidisciplinary environments.
- PO 12 :Recognize the need for life-long learning in the broadest context of technological change.

Program-Specific Outcomes (PSOs)

- PSO 1 Make the students employable in engineering industries.
- PSO 2 Motivate the students for higher studies and research.

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Third Year
Semester - V

Subject: Heat Transfer (BTMEC501)

Course Outcomes:

1. Explain heat transfer laws, derive the general heat conduction equation, and apply it to 1-D steady-state heat transfer in regular shapes.
2. Describe critical radius of insulation, overall heat transfer coefficient, thermal conductivity, and lumped heat transfer.
3. Interpret extended surfaces.
4. Illustrate the boundary layer concept, dimensional analysis, forced and free convection under various conditions.
5. Describe boiling heat transfer, mass transfer, and evaluate heat exchangers using LMTD and NTU methods in engineering problems.
6. Explain thermal radiation, black body, emissivity, reflectivity, view factor evaluation, and radiation shields.

Subject: Applied Thermodynamics - I (BTMEC502)

Course Outcomes:

1. Define calorific value of fuel, stoichiometric air-fuel ratio, excess air, equivalent evaporation, boiler efficiency, etc., and calculate minimum air required for fuel combustion.
2. Study and analyze gas and vapor power cycles (Otto, Diesel, dual, Joule, and Rankine) and derive expressions for thermal efficiency and other performance parameters.
3. Classify various types of boilers, nozzles, steam turbines, and condensers used in steam power plants.
4. Classify various types of IC engines, sketch a typical diesel engine cut section, label its components, and define terms like TDC, BDC, and rc.
5. Draw P-v diagrams for single-stage reciprocating air compressors with and without clearance volume, evaluate their performance, and differentiate between reciprocating and rotary air compressors.

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Subject: Machine Design - I (BTMEC503)

Course Outcomes:

1. Formulate design problems by identifying customer needs and converting them into desi specifications.
2. Understand component behavior under loads and identify failure criteria.
3. Analyze stresses and strains induced in components.
4. Design machine components using theories of failures.
5. Design components for finite and infinite life under fluctuating loads.
6. Design components like shafts, keys, couplings, screws, and springs.

Subject: Theory of Machines - II (BTMEC504)

Course Outcomes:

1. Identify and select the type of belt and rope drive for specific applications.
2. Evaluate gear tooth geometry and select appropriate gears/gear trains.
3. Define governors and select/suggest appropriate governors for specific applications.
4. Characterize flywheels based on engine requirements.
5. Understand gyroscopic effects in ships, airplanes, and road vehicles.
6. Understand free and forced vibrations of single-degree freedom systems.

Subject: Metrology and Quality Control (BTMEC505)

Course Outcomes:

1. Identify techniques to minimize measurement errors.
2. Identify methods/devices for measuring length, angle, gear/thread parameters, surface roughness, and geometric features of parts.

3. Choose limits for plug and ring gauges.
4. Explain measurement methods in modern machinery.
5. Select quality control techniques and their applications.
6. Plot quality control charts and suggest measures to improve product quality and reduce using statistical tools.

Subject: Automobile Engineering (BTMEC506A)

Course Outcomes:

1. Identify different parts of an automobile.
2. Explain the working of various parts like engine, transmission, clutch, brakes, etc.
3. Demonstrate various types of drive systems.
4. Apply vehicle troubleshooting and maintenance procedures.
5. Analyze the environmental implications of automobile emissions and suggest regula modifications.
6. Evaluate future developments in automobile technology.

Subject: Nanotechnology (BTMEC506B)

Course Outcomes:

1. Understand length scales, nanostructures, and nanotechnology concepts.
2. Learn about various synthesis and characterization techniques in nanotechnology.
3. Understand interactions at the molecular scale.
4. Evaluate and analyze the mechanical properties of bulk nanostructu metals, alloys, nanocomposites, and carbon nanotubes.
5. Understand the effects of using nanoparticles compared to conventional methods.
6.

Subject: Energy Conservation and Management (BTMEC506C)

Course Outcomes:

1. Understand the energy problem and the need for energy management.

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Semester VI

Subject: Manufacturing Processes - II (BTMEC601)

Course Outcomes:

1. Understand the powder metallurgy process and its applications.
2. Calculate cutting forces in orthogonal and oblique cutting.
3. Evaluate the machinability of materials.
4. Understand abrasive processes.
5. Explain different precision machining processes.
6. Design jigs and fixtures for specific applications.

Subject: Machine Design - II (BTMEC602)

Course Outcomes:

1. Define the function of bearings and classify them.
2. Understand bearing failure and its influence on selection.
3. Classify friction clutches and brakes and determine torque capacity and friction disk parameters.
4. Select materials and configurations for machine elements like gears, belts, and chains.
5. Design elements like gears, belts, and chains for given power ratings.
6. Design the thickness of pressure vessels using thick and thin criteria.

Subject: Engineering Tribology (BTMEC604A)

Course Outcomes:

1. Understand the basics and importance of tribology.
2. Evaluate the nature of engineering surfaces, their topography, and surface characterization techniques.
3. Analyze the basic theories of friction and frictional behavior of various materials.
4. Select a suitable lubricant for a specific application.

5. Compare different wear mechanisms.
6. Suggest suitable material combinations for tribological design.

Subject: Additive Manufacturing (BTMEC604C)

Course Outcomes:

1. Understand the importance of additive manufacturing.
2. Classify different AM processes.
3. Design for AM processes.
4. Understand the applications of AM.
5. Differentiate post-processing techniques.

Subject: Mechanical Measurements (BTMEC604D)

Course Outcomes:

1. Define measurement parameters and identify errors in measurement.
2. Identify methods and devices for measuring length and angle.
3. Identify methods and devices for measuring pressure, flow, force, torque, strain, velocity, displacement, acceleration, and temperature.

Subject: Quantitative Techniques in Project Management (BTMEC605A)

Course Outcomes:

1. Define and formulate research models to solve real-life problems by allocating limited resources using linear programming.
2. Apply transportation and assignment models to real-life situations.
3. Apply queuing theory for performance evaluation of engineering and management systems.
4. Apply mathematical tools for decision-making regarding item replacement in real life.
5. Determine EOQ, ROP, and safety stock for different inventory models.
6. Construct a project network and apply CPM and PERT methods.

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Subject: Sustainable Development (BTMEC605B)

Course Outcomes:

1. Explain the difference between development and sustainable development.
2. Explain challenges of sustainable development and climate change.
3. Explain sustainable development indicators.
4. Analyze sustainable energy options.
5. Understand the social and economic aspects of sustainable development.

Subject: Renewable Energy Sources (BTMEC605C)

Course Outcomes:

1. Explain the difference between renewable and non-renewable energy.
2. Describe the working of solar collectors.
3. Explain various applications of solar energy.
4. Describe the working of other renewable energies like wind and biomass.

Subject: Biology for Engineers (BTMEC606A)

Course Outcomes:

1. Explain the origin of life, evolution, cells, and biomolecules like lipids.
2. Understand other biomolecules.
3. Understand cell structure and function, and the cell cycle.
4. Explain Mendelian genetics.
5. Understand and explain DNA structure, DNA replication, transcription, and translation.

Subject: Solar Energy (BTMEC606B)

Course Outcomes:

1. Describe the measurement of direct, diffuse, and global solar radiation falling on horizontal and inclined surfaces.
2. Analyze the performance of flat plate collectors, air heaters, and concentrating type collectors.
3. Understand test procedures and apply them while testing different types of collectors.
4. Study and compare various thermal energy storage systems.

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Final Year
SEM VII
Program Outcomes

At the end of the program the student will be able to:

PO 1: Apply the knowledge of mathematics, basic sciences, and mechanical engineering to the solution of complex engineering problems.

PO 2: Identify, formulate, research literature, and analyze complex mechanical engineering problems reaching substantiated conclusions.

PO 3: Design solutions for complex engineering problems and design mechanical system Components that meet the specified needs.

PO 4: Use mechanical engineering research-based knowledge related to interpretation of data and provide valid conclusions.

PO 5: Create, select, and apply modern mechanical engineering and IT tools to complex engineering activities with an understanding of the limitations.

PO 6: Apply reasoning acquired by the mechanical engineering knowledge to assess Societal and safety issues.

PO 7: Understand the impact of engineering solutions on the environment, and demonstrate the knowledge for sustainable development.

PO 8:Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO 9:Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communicate effectively on complex engineering activities with the engineering Community and with society at large.

PO 11: Understand the engineering and management principles and apply these to the Multidisciplinary environments.

PO 12: Recognize the need for life-long learning in the broadest context of technological Change.

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Program-Specific Outcomes (PSOs)

PSO 1: Make the students employable in engineering industries.

PSO 2 : Motivate the students for higher studies and research.

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Department of Mechanical & Automation Engineering

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Final Year Course Outcomes

Mechatronics (BTMC701)

Course Outcomes:

1.Define sensor, transducer and understand the applications of different sensors and transducers

2. Explain the signal conditioning and data representation techniques

3. Design pneumatic and hydraulic circuits for a given application

4. Write a PLC program using Ladder logic for a given application

5. Understand applications of microprocessor and micro controller

6. Analyse PI, PD and PID controllers for a given application

Industrial Engineering and Management (BTHM702)

Course Outcomes:

1. Impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering

2. Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.

3. Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society.

4. Understand their role as engineers and their impact to society at the national and global context.

Elective V

Design of Air Conditioning Systems (BTMPE703A)

Course Outcomes:

1. Understand the cooling load calculation

2. Explain concept of ventilation and its implementation

3. Learn duct design applied to real life situation

4. Learn and differentiate the various modern air conditioning systems/units

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Biomechanics (BTMPE703B)

Course Outcomes:

1. Explain various forces and mechanisms and define Newton's law of motion, work and energy, moment of inertia
2. Describe forces and stresses in different human joints
3. Discuss bio fluid mechanics in cardiovascular and respiratory system in human body
4. Differentiate between hard tissues and soft tissues
5. Understand concepts of implants and Identify different techniques used in biomechanics implants.

Non-conventional Machining (BTMPE703C)

Course Outcomes:

1. Understand the principles and working of various non-conventional machining processes
2. Analyze the process parameters and their effect on the performance measures of non-conventional machining processes
3. Select appropriate non-conventional machining process for a given application
4. Understand the applications and limitations of non-conventional machining processes

Advanced IC Engines (BTMPE703D)

Course Outcomes:

1. Understand the working principles of advanced IC engines
2 Analyze the performance and emission characteristics of advanced IC engines
3 Explain the working of modern fuel injection systems and emission control techniques
4 Discuss the recent trends and developments in IC engines

Additive Manufacturing (BTMPE703E)

Course Outcomes:

1 Understand the importance of Additive Manufacturing
2 Classify the different AM processes
3 Design for AM processes

4 Understand the applications of AM

5 Differentiate the post processing processes

Surface Engineering (BTMPE703F)

Course Outcomes:

1 Understand the importance of surface engineering and its applications

2 Classify the different surface engineering techniques

3 Explain the working principles and process parameters of various surface engineering techniques

4 Analyze the properties and performance of surface engineered components

5 Select appropriate surface engineering technique for a given application

Processing of Polymers (BTPPE703D)

Course Outcomes:

1 Understand the fundamentals of polymer processing

2 Explain the working principles and process parameters of various polymer processing techniques

3 Analyze the properties and performance of polymer processed components

4 Select appropriate polymer processing technique for a given application

Stress Analysis (BTMPE703G)

Course Outcomes:

1 Understand the fundamentals of stress analysis

2 Explain the principles and techniques of experimental stress analysis

3 Analyze the stress distribution in structural components using analytical and numerical methods

4 Select appropriate stress analysis technique for a given application

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Open Elective-III

Sustainable Development (BTMOE704A).

Course Outcomes:

1 Explain the difference between development and sustainable development
2 Explain challenges of sustainable development and climate change
3 Explain sustainable development indicators
4 Analyze sustainable energy options
5 Understand social and economic aspects of sustainable development

Entrepreneurship Development (BTMOE704B)

Course Outcomes:

1 Impart fundamental knowledge and skill sets required in the Entrepreneurship profession
2 Produce ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy
3 Understand the interactions between engineering, businesses, technological and environmental spheres in the modern society
4. Understand their role as entrepreneurs and their impact to society at the national and global

Plant Maintenance (BTMOE704C)

Course Outcomes:

1. Recognize and enlist probable failures in mechanical elements
2. Dismantle, assemble and align mechanisms in sequential order for given assembly
3. Compare maintenance practices like on-line, shut down, corrosion, productive and preventive maintenance
4. Analyze economics of plants and list factors affecting the maintenance of a plant
5. Correlate the linkages between different maintenance aspects and how they impact on overall maintenance effectiveness
6. Develop maintenance strategies for improving plant reliability and availability

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Open Elective –IV

Engineering Economics (BTMOE705A)

Course Outcomes:

1 Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, Benefit-cost ratio

2 Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions

3 Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems

4 Compute the depreciation of an asset using standard Depreciation techniques to assess its impact on present or future value

5 Apply all mathematical approach models covered in solving engineering economics problems: mathematical formulas, interest factors from tables, Excel functions and graphs. Estimate reasonableness of the results

6 Examine and evaluate probabilistic risk assessment methods

7 Compare the differences in economic analysis between the private and public sectors. Recognize the limits of mathematical models for factors hard to quantify

8 Develop and demonstrate teamwork, project management, and professional communications skills

Biology for Engineers (BTMOE705B)

Course Outcomes:

CO1 Explain origin of life and Evolution, Cells, Biomolecules-Lipids

CO2 Understand Biomolecules

CO3 Understand Cell structure and function and cell cycle

CO4 Explain Mendelian genetics

CO5 Understand and Explain DNA structure, DNA replication, Transcription, Translation

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Intellectual Property Rights (BTMOE705C)

Course Outcomes:

1 Understand the fundamentals of intellectual property rights

2 Explain the different types of intellectual property rights and their legal framework

3 Analyze the process of obtaining and protecting intellectual property rights

4 Discuss the role of intellectual property rights in fostering innovation and entrepreneurship

5 Identify and address ethical and legal issues related to intellectual property rights

Mechanical Engineering Lab –V (BTMCL706)

Course Outcomes:

1 Perform experiments related to Mechatronics systems

2 Analyze the performance of Mechatronics systems

3 Design and develop Mechatronics systems for given applications

Mini Project (BTMP707)

Course Outcomes:

CO1 Identify and define a problem statement

CO2 Conduct literature review and market survey

CO3 Design and develop a prototype/solution

CO4 Test and evaluate the prototype/solution

CO5 Prepare a technical report and present the work

IT – 3 Evaluation (BTMI609)

Course Outcomes:

1 Demonstrate the ability to use IT tools for data analysis and visualization

2 Apply appropriate IT tools for project management and communication

3 Exhibit proficiency in using software for engineering application

P.E.S. College of Engineering

Nagsenvan, Aurangabad

Department of Civil Engineering

1.1. Course Outcomes (COs)

1) Course Name:- BTCVC302Mechanics of Solids **Year of Study:-**

1) Perform the stress-strain analysis.
2) Draw force distribution diagrams for members and determinate beams.
3) Find deflections in determinant beams.
4) Visualize force deformation behavior of bodies.

2) Course Name:- BTCVC303 Hydraulics I

1: Calibrate the various flow measuring devices.
2: Determine the properties of fluid and pressure and their measurement.
3: Understand fundamentals of pipe flow, losses in pipe and analysis of pipe network.
4: Visualize fluid flow phenomena observed in Civil Engineering systems

3) Course Name:- **BTCVC304 Surveying – I**

1: Perform measurements in linear/angular methods.
2: Perform plane table surveying in general terrain.
3: Know the basics of leveling and theodolite survey in elevation and angular measurements.

4) Course Name:- BTCVC305 Building Construction

1: Understand types of masonry structures.
2: Understand composition of concrete and effect of various parameters affecting strength.
3: Comprehend components of building and there purposes.
4: Comprehend the precast and pre-engineered building construction techniques.

5) Course Name:- BTCVC306Engineering Geology.

1: Recognize the different land forms which are formed by various geological agents.
2: Identify the origin, texture and structure of various rocks and physical properties of mineral.
3: Emphasize distinct geological structures which have influence on the civil engineering structure.
4: Understand how the various geological conditions affect the design parameters of structures.

6) Course Name:- BTCVC401Hydraulics II

1: Design open channel sections in a most economical way.
2: Know about the non-uniform flows in open channel and the characteristics of hydraulic jump.
3: Understand application of momentum principle of impact of jets on plane.

7) Course Name:- BTCVC402Surveying – II

1: Understand basics different types of curves on roads and their preliminary survey.
2: Perform setting of curves, buildings, culverts and tunnels.
3: Comprehend different geodetic methods of survey such as triangulation, trigonometric leveling.
4: Comprehend modern advanced surveying techniques.

8) Course Name:- BTCVC403Structural Mechanics – I.

1: Describe the concept of structural analysis, degree of indeterminacy.
2: Calculate slopes and deflection at various locations for different types of beams.
3; Identify determinate and indeterminate trusses and calculate forces in the members of trusses Perform the distribution of the moments the in continuous beam and frame.

9) Course Name:- BTCVE404A Numerical Methods in Engineering

1: Demonstrate the nuances of management functions.
2: Analyze the framework of a business organization.
3: Adopt an empirical approach toward business situations.
4: Apply various Management techniques.

10) Course Name:- BTCVC 501 Design of Steel Structures

1: Identify and compute the design loads and the stresses developed in the steel member.
2: Analyze and design the various connections and identify the potential failure modes.
3: Analyze and design various tension, compression and flexural members.
4: Understand provisions in relevant BIS Codes.

11) Course Name:- BTCVC 502 Structural Mechanics-II

1: Have a basic understanding of matrix method of analysis and will be able to analyze the determinant structure.
2: Have a basic understanding of the principles and concepts related to finite difference and finite element methods
3: Have a basic understanding of concept of influence line.

12) Course Name:- BTCVC 503 Soil Mechanics

1: Understand different soil properties and behavior
2: Understand stresses in soil and permeability and seepage aspects.
3: Develop ability to take up soil design of various foundations.

13) Course Name:- BTCVC 504 Environmental Engineering

1: Apply the water treatment concept and methods.
2: Prepare basic process designs of water and wastewater treatment plants.
3: Apply the wastewater treatment concept and methods.
4: Apply the solid waste management concepts.

14) Course Name:- BTCVC 505 Transportation Engineering.

1. Comprehend various types of transportation systems and their history of the development
2. Comprehend to various types of pavements
3. Design the pavements by considering various aspects associated with traffic safety measures.

15) Course Name:- BTCVE506A Materials, Testing &Evaluation

1. To develop skill among students to construct strong and durable structures by applying knowledge of material science.
2. To make the students aware of quality assurance and control in their real life as a professional.

16) Course Name:- BTCVE506C Development Engineering.

1. To develop multi scaled perspective about decisions in the built environment,
2. To expose the students to the analysis and evaluation of real world problems aiming to bring desired change in the society.

17) Course Name:- BTCVC601Design of Concrete Structures – I

1. Comprehend to the various design philosophies used for design of reinforced concrete.
2. Analyze and design the reinforced concrete slab using limit state and working state method.
3. Analyze and design the reinforced concrete beam using limit state and working state method.
4. Analyze and design the reinforced concrete column using limit state and working state method.

18) Course Name:- BTCVC602Foundation Engineering

1. To predict soil behavior under the application of loads and come up with appropriate solutions to foundation design queries.
2. Analyze the stability of slope by theoretical and graphical methods.
3. Analyze the results of in-situ tests and transform measurements and associated uncertainties into relevant design parameters.
4. Synthesize the concepts of allowable stress design, appropriate factors of safety, margin of safety, and reliability.

19) Course Name:- BTCVC603Concrete Technology

1: Understand the various types and properties of ingredients of concrete.
2: Understand effect of admixtures on the behavior of the fresh and hardened concrete.
3: Formulate concrete design mix for various grades of concrete.

20) Course Name:- BTCVC604Project Management

1. Understand various steps in project Management, different types of charts.
2. Construct network by using CPM and PERT method.
3. Determine the optimum duration of project with the help of various time estimates.
4. Know the concept of engineering economics, economic comparisons, and linear break even analysis problems.
5. Understand the concept of total quality Management including Juran and Deming's philosophy.

21) Course Name:- BTCVC606Building Planning and Design

1. To plan buildings considering various principles of planning and bye laws of governing body.
2. Comprehend various utility requirements in buildings.
3. Understand various techniques for good acoustics.

22) Course Name:- BTCVE605AWaste Water Treatments

1. Determine the sewage characteristics and design various sewage treatment plants.
2. Understand municipal water and wastewater treatment system design and operation.
3. Apply environmental treatment technologies and design processes for treatment of industrial waste water.
4. Understand the rural sanitation schemes.

23) Course Name:- BTCVE605DAdvanced Engineering Geology

1) Understand geological time scale and physiographic division of India and their geological characteristics and different
geological formation in India.
2) Perform sub surface exploration and interpret core log.
3) Solve numerical problem based on core drilling and seismic data.
4) Familiar with origin of earthquake, seismic wave and landslide in Deccan trap.

24) Course Name:- BTCVE 605E Advanced Soil Mechanics.

1: Behavior of soil based on its particle size and mineral content
2: Ability to understand the Earth work equipment
3: Ability to understand the necessity of ground improvement and potential of a ground for improvement
4: Understand the soil reinforcement mechanisms
5: Understand the grouting and injection methods.

25) Course Name:- BTCVC 701 Design of Concrete Structures II

1. Able to identify the behavior, analyze and design of the beam sections subjected to torsion.
2. Able to analyze and design of axially and eccentrically loaded column and construct the interaction diagram for them.
3. Understand various concepts, systems and losses in pre-stressing.
4. Able to analyze and design the rectangular and symmetrical I-section pre-stressed beam/girders.

26) Course Name:- BTCVC 702Infrastructure Engineering

1. Know about the basics and design of various components of railway engineering
2. Understand the types and functions of tracks, junctions and railway stations.
3. Know about the aircraft characteristics, planning and components of airport
4. Understand the types and components of docks and harbors.

27) Course Name:- BTCVC 703Water Resources Engineering

1: Understand need of Irrigation in India and water requirement as per farming practice in India.
2: Understand various irrigation structures and schemes.
3: Develop basis for design of irrigation schemes.

28) Course Name:- BTCVC 704 Professional Practices

1. Understand the importance of preparing the types of estimates under different conditions for various structures.
2. Know about the rate analysis and bill preparations and to study about the specification writing.
3. Know the various types of contract, accounts in PWD, methods for initiating the works in PWD and tendering.
4. Understand the valuation of land and buildings, various methods and factors affecting valuation.

29) Course Name:- BTCVE705A Plastic Analysis and Design

1. Understand modes of structural collapse.
2. Perform the plastic analysis and design of various determinant and in-determinant structures.

30) Course Name:- BTCVC 801Introduction to Earthquake Engineering

1. Capture complexities in earthquake resistant design of structures
2. Grasp Nature of earthquake vibration and associated forces on structures
3. Understand importance of designing the building to targeted seismic performance.

31) Course Name:- BTCVE802BConstruction Techniques.

1. Understand the planning of new project with site accessibility and services required.
2. Comprehend thevarious civil construction equipment's.
3. Familiar with layout of RMC plant, production, capacity and operation process.
4. Recognize various aspect of road construction, construction of diaphragm walls, railway track construction etc.

32) Course Name:- BTCVE803ABridge Engineering

1. Understand components of bridges and its various types.
2. Understand site selection criteria and comprehend various forces acting on bridges.
3. Analyze bridge structures using different analysis techniques.
4. Understand the importance of different types of bridge bearings.

33) Course Name:- BTCVE803BStructural Audit

1. Gain the knowledge of Bye laws, procedure of Structural audit and study the typical problems in structures.
2. Aware of causes and types of deterioration in structures.
3. Develop skills for use of various Nondestructive tests required during auditing of structures.
4. Strength evaluation of existing structures.
5. Acquire knowledge of legal procedure to conduct structural audits.
6. Prepare a Structural audit report.

34) Course Name:-BTCVE804ARock Mechanics

1: Understand the mechanism of rock under various conditions.
2: Able to determine the engineering properties of rocks and sub-surface conditions
3: Identify various cause of slope failure and suggest some preventive measures for them.

35) Course Name:- BTCVE804DFinite Element Method

1. Understand the different energy methods in structural analysis and basic concepts of finite element method.
2. Analyze 1-D problems related to structural analysis like Bars, Trusses, Beams and Frames using finite element approach.
3. Find solution to problems using direct approach methods like Rayleigh – Ritz or Galerkin' s Method.
4. Solve 2-D problems using knowledge of theory of elasticity.
5. Students will be able to implement the knowledge of numerical methods in FEM to find the solution to the various problems in statics and dynamics.
6. Analyze 1D, 2D, and 3D structures using different software packages based on FEM.

36) Course Name:- BTCVE804ERepair & Rehabilitation of Structures.

1. Understand factors of Serviceability and Durability of Structures.
2. Determine crack width, effect of crack on materials, effect of moisture on structures.
3. Understand methods for protection of steel structures and masonry structures.
4. Understand various materials and methodologies used for repairing of structures.
5. Understand and implement techniques used for repairing and maintenance of structure.
6. Understand procedure to strengthen the existing structures and structural elements.

(A) PROGRAM OUTCOMES(POs)

Engineering Graduates will be able to:

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

(B) PROGRAM SPECIFIC OUTCOMES (PSOs)

1. The civil engineering department is dedicated to educate and train under graduate level civil engineering students in up-to-date technical knowledge in civil engineering and its use.
2. The department is committed to develop the state of the art technical infrastructure having ultra modern laboratory facilities.
5. Obliged to cultivate unblemished and congenial academic environment for pleasant and complete learning experience.

2.C.1

Course Objectives for Second Year
B. Tech in Electronics and Computer Engineering
Academic Year 2023-24, SEM III

Sr. No.	Course Title	Course Code	Course Objectives
1	BTES301	Engineering Mathematics-III	1. To study the concepts of transformations, used in various field of Eelctronics & Computer 2. To study partial differential equations to apply it in computer and electronics engineering.
2	BTECPC302	Electronics Devices and Circuits	1. Understand working of semiconductor devices such as FET & MOSFET. 2. Gain knowledge on the linear and nonlinear applications of operational amplifiers. 3. Understand difference between amplifier & Oscillator 4. Understand working of various sensors & Actuators.
3	BTECPC303	Programming, Data Structures and Algorithm Using C	1. Providing a strong foundation of fundamental basics of Data Structures and Algorithms. 2. Demonstrating awareness and fundamental understanding of various applications of Data Structures and Algorithms. 3. Applying relevant data structure and algorithms for problem solving.
4	BTESC304	Computer Architecture and Operating Systems	1. To understand the services provided by and the design of an operating system. 2. Understand the structure, organization memory management 3. To understand the structure, function, and characteristics of computer systems 4. To identify the elements of modern instructions sets and their impact on processor design
5	BTESC305	Digital Electronics & Microprocessor	1. To provide a strong foundation of fundamental basics of Digital Electronics & microprocessor 2. Demonstrate awareness and fundamental understanding of various Combinational and sequential circuits 3. To impart knowledge about microprocessor

Head of Department
Dr.V.K.Kadam

Professor & Head
Department of Electronics &
Computer Engineering
P.E.S. College of Engineering
Nagsenvan,Chh. Sambhajinagar-431002

Dr. Babasaheb Ambedkar Technological University, Lonere- 402103

P.E.S.College of Engineering, Aurangabad

Department of Electronics and Computer Engineering

Course Coordinator : Prof. Jyoti P Zine

Course Name : Data Analysis

Course Code :BTEC PE405B

Academic Year : 2023-24 (PART II)

Semester I / II : II

Prof Jyoti P Zine

Professor & Head
Department of Electronics & Computer Engineering
P E S College of Engineering
Aurangabad, (MS) 431005

	Program Educational Objectives(PEO) and Program Specific Outcomes (PSO)	Year : 2023 2024 Semester : I / II

Program Educational Objectives (PEO)

PEO1	To equip graduates with a strong foundation in engineering sciences and Electronics & Computer Engineering fundamentals to become effective collaborators, researchers and real-time problem solvers with technical competencies.
PEO2	Perceive the limitation and impact of engineering solutions in social, legal, environmental, economic and multidisciplinary contexts.
PEO3	Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness

	Program Outcomes (PO)	Year : 2023 2024 Semester : I / II

PROGRAM OUTCOMES: Upon successful completion of this course it is expected that electronics graduate will be able to:

	Program Outcome
PO1.	**Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2.	**Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3.	**Design/ Development of Solutions:**Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.

PO4.	**Conduct investigations of complex problems** :use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5.	**Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an under- standing of the limitations.
PO6.	**The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7.	**Environment and Sustainability:** Understand the impact of professional engineering solutions in soci- etal and environmental contexts and demonstrate knowledge of and need for sustainable develop-ment.
PO8.	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9.	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
PO10.	**Communication:** Communicate effectively on complex engineering activities with the engineering com-munity and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO11.	**Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12.	**Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change

	Course Objective and Course Outcomes	Year : 2023-2024 Semester : I / II

Course Objective : As part of this course, Students	
1.	To obtain a Comprehensive knowledge of various tools and techniques for Data transformation and visualisation
2.	To learn the probability and probabilistic models of data science
3.	To learn the basic statistics and testing hypothesis for specific problems
4.	To learn the basic statistics and testing hypothesis for specific problems
5.	To learn about the prediction models
6.	To give a hands-on experience with real-world data analysis

Course Outcomes : At the end of course, the student will be able to	
CO1	Apply preprocessing techniques to convert raw data so as to enable further analysis
CO2	Apply exploratory data analysis and create insightful visualizations to identify patterns
CO3	Understand how to derive the probability density function of transformations of random variables and use these techniques to generate data from various distributions
CO4	Understand the statistical foundations of data science and analyze the degree of certainty of predictions using statistical test and models
CO5	Introduce machine learning algorithms for prediction and to derive insights
CO6	Apply preprocessing techniques to convert raw data so as to enable further analysis

	Mapping of Course Objective and Course Outcomes	Year : 2023 2024 Semester : I / II

Mapping of Course Outcomes (COs) with Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	yes		yes			yes	yes					
CO2		yes									yes	
CO3											yes	
CO4	yes			yes					yes			yes
CO5	yes		yes				yes					
CO6						yes			yes	yes		

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSO)

	PO1	PO2	PO3	PO4	PO5
CO1	yes	yes		yes	
CO2	yes	yes		yes	
CO3			yes		yes
CO4	yes		yes		
CO5	yes				

	Teaching Plan	Year : 2023 2024 Semester : I / II

Bloom Levels: 1. Remember 2.Understand 3. Apply 4.Analysis 5. Create

No. of Lecture	Date	Topic / Sub - Topic	Course Outcome No. and Bloom Level	Refer (Text Book, Website) Page no. ____ to ____
1	Day1	The statistical Methods, Misuse, Misinterpretation and bias, Sampling and sampling size	1,2	Dr. Michael J de Smith, Statistical Analysis Handbook,
2	Day 2	Data preparation and cleaning, Missing data and data errors	1,2,3	Dr. Michael J de Smith, Statistical Analysis Handbook,
3	Day 3	Exploratory Data Analysis, Statistical error	1,2,3	Dr. Michael J de Smith, Statistical Analysis Handbook,
4	Day 4	Statistical Modeling, Computational Statistics	2,3,4	Dr. Michael J de Smith, Statistical Analysis Handbook,
5	Day 5	Inference, Bias, Cofounding	2,3	https://www.statsref.com/HTML/index.html
6	Day6	Hypothesis testing,Types of error, Statistical significance, Confidence Interval	1,2,3	https://www.statsref.com/HTML/index.html
7	Day7	Power and robustness, Degrees of freedom	2,3	Dr. Michael J de Smith, Statistical Analysis Handbook,
8	Day8	Non parametric analysis	2,3,4	https://www.statsref.com/HTML/index.html
9	Day9	Counts and specific values, Measure of central tendency	2,3,4	
10	Day10	Measure of spread, Measure of distribution shape	2,3,4	https://www.statsref.com/HTML/index.html
11	Day11	Statistical indices	2,3,4	
12	Day12	Moments, Key functions	2,3,4	https://www.statsref.com/HTML/index.html
13	Day13	Measures of complexity and model selection.	2,3,4	

14	Day14	Box-Cox and power transforms	1,2,3,4	
15	Day15	Box-Cox and power transforms(Examples)	2,3,4	https://www.statsref.com/HTML/index.html
16	Day16	Freeman-Tukey (square root and arcsine) transforms	1,2,3,4	https://www.statsref.com/HTML/index.html
17	Day17	Freeman-Tukey (square root and arcsine) transforms (Examples)	2,3,4	https://www.statsref.com/HTML/index.html
18	Day18	Log and Exponential transforms	1,2,3,4	https://www.statsref.com/HTML/index.html
19	Day19	Logit transforms	2,3	https://www.statsref.com/HTML/index.html
20	Day20	Logit transforms (Examples)	3,4	https://www.statsref.com/HTML/index.html
21	Day21	Normal transform.	3,4	https://www.statsref.com/HTML/index.html
22	Day22	Goodness of fit tests: Anderson-Darling	3,4	https://www.statsref.com/HTML/index.html
23	Day23	Chi-square test, Kolmogorov-Smirnov	3,4	https://www.statsref.com/HTML/index.html
24	Day24	Ryan-Joiner, Shapiro-Wilk, Jarque-Bera	1,2,3,4	https://www.statsref.com/HTML/index.html
25	Day25	Lilliefors; *Z*- test: test of single mean, standard deviation known	3,4	https://www.statsref.com/HTML/index.html
26	Day26	Test of the difference between two means, standard deviation known	2,3,4	https://www.statsref.com/HTML/index.html
27	Day27	test for proportions, P	4	https://www.statsref.com/HTML/index.html
28	Day28	T-tests: test of single mean, standard deviation not known	3,4	https://www.statsref.com/HTML/index.html
29	Day29	Test of the difference between two means, standard deviation not known	2,3,4	https://www.statsref.com/HTML/index.html
30	Day30	test of regression coefficients;	1,2,3	https://www.statsref.com/HTML/index.html

31	Day31	Variance test: Chi square test of single variable, F-test of two variables	,1,2,3	https://www.statsref.com/HTML/index.html
32	Day32	test of homogeneity; Wilcoxon rank-sum/Mann-Whitney U test	3,4	https://www.statsref.com/HTML/index.html
33	Day33	Sign test.	3,4	https://www.statsref.com/HTML/index.html
34	Day34	Contingency Tables: Chi-square contingency table test	3,4	https://www.statsref.com/HTML/index.html
35	Day35	G contingency table test, Fisher's exact test, Measures of association, McNemar's test.	3,4	https://www.statsref.com/HTML/index.html
36	Day36	G contingency table test, Fisher's exact test, Measures of association, McNemar's test.	3,4	https://www.statsref.com/HTML/index.html
37	Day37	ANOVA: Single factor or one way ANOVA	2,3,4	https://www.statsref.com/HTML/index.html
38	Day38	Two factor or two-way and higher-way ANOVA	2,3,4	https://www.statsref.com/HTML/index.html
39	Day39	MANOVA, ANCOVA; Non Parametric ANOVA: Kruskal Wallis ANOVA	2,3,4	https://www.statsref.com/HTML/index.html
40	Day40	MANOVA, ANCOVA; Non Parametric ANOVA: Kruskal Wallis ANOVA	1,2,3	https://www.statsref.com/HTML/index.html
41	Day41	Friedam ANOVA test, Mood's median	1,2,3	https://www.statsref.com/HTML/index.html
42	Day42	Mood's median	1,2,3	https://www.statsref.com/HTML/index.html

Subject Teacher(SY ECE)
Prof.J.P.Zine

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P.E.S. College of Engineering
Nagsenvan,Chh. Sambhajinagar-431002

Dr. Babasaheb Ambedkar Technological
University, Lonere 402103

P.E.S. College of Engineering, Aurangabad

Department of Electronics and Computer Engineering

Course Coordinator : Prof. P.K. Ubhe

Course Name : Digital Electronics and [illegible]

Course Code : BTEXM 305

Academic Year : 2023-24

Semester I / II :

Professor & Head
Department of Electronics &
Computer Engineering
P.E.S. College of Engineering
Nagsenvan Cha. Aurangabad-431005

	Program Educational Objectives(PEO) and Program Specific Outcomes (PSO)	Year : 2023 2024 Semester : I / II

Program Educational Objectives (PEO)

1.	To equip graduates with a strong foundation in engineering sciences and Electronics & Telecommunication Engineering fundamentals to become effective collaborators, researchers and real-time problem solvers with technical competencies.
2.	Perceive the limitation and impact of engineering solutions in social, legal, environmental, economical and multidisciplinary contexts.
3.	Excel in Industry/technical profession, higher studies, and entrepreneurship exhibiting global competitiveness.

Program Specific Outcomes (PSO)

1.	Specify, design, build and test analog, digital and embedded systems for signal processing
2.	Understand and architect wired and wireless analog and digital communication systems as per specifications, and determine their performance.
3.	Ability to design and implement the acquired technical knowledge with proficiency in logical programming for applications in electronics engineering.
4.	Apprehend and analyze specific engineering problems by applying the knowledge of basic sciences, engineering mathematics and engineering fundamentals.
5.	Ability to communicate effectively with excellent interpersonal skills and demonstrate the practice of professional ethics for societal benefit.

	Program Outcomes (PO)	Year : 2023-2024 Semester : I / II

PROGRAM OUTCOMES: Upon successful completion of this course it is expected that electronics graduate will be able to:

	Program Outcome
PO1.	**Engineering Knowledge:** Apply knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
PO2.	**Problem Analysis:** Identify, formulate, research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3.	**Design/ Development of Solutions:**Design solutions for complex engineering problems and design system components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
PO4.	**Conduct investigations of complex problems** :use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
PO5.	**Modern Tool Usage:** Create, select and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an under- standing of the limitations.
PO6.	**The Engineer and Society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.
PO7.	**Environment and Sustainability:** Understand the impact of professional engineering solutions in soci-etal and environmental contexts and demonstrate knowledge of and need for sustainable develop-ment.
PO8.	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO9.	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams and in multidisciplinary settings.
PO10.	**Communication:** Communicate effectively on complex engineering activities with the engineering com-munity and with society at large, such as being able to comprehend and write

	effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO11.	**Project Management and Finance:** Demonstrate knowledge and understanding of engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12.	**Life-long Learning:** Recognize the need for and have the preparation and ability to engage in independent and life- long learning in the broadest context of technological change

	Course Objective and Course Outcomes	Year : 2022 - 2023 Semester : I / II

Course Objective : As part of this course, Students	
1.	To provide the fundamental concepts associated with digital logic and circuit design.
2.	To familiarize with the different number systems, logic gates, and combinational and sequential circuits utilized in the different digital circuits and systems
3.	To lay the foundation for further studies in areas such as communication, VHDL, computer.
4.	To introduce students with the architecture and operation of typical microprocessors and microcontrollers.
5.	To familiarize the students with the programming and interfacing of microprocessors and microcontrollers.
6.	To provide a strong foundation for designing real world applications using microprocessors and microcontrollers.

Course Outcomes : At the end of course, the student will be able to	
CO1	Design and analyze combinational logic circuits.
CO2	Design & analyze modular combinational circuits with MUX/DEMUX, Decoder, Encoder.
CO3	Design & analyze synchronous sequential logic circuits.
CO4	Use HDL & appropriate EDA tools for digital logic design and simulation.

	Mapping of Course Objective and Course Outcomes	Year : 2023 - 2024 Semester : I / II

Mapping of Course Outcomes (COs) with Program Outcomes (POs):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1				✓			✓			✓		
CO2		✓			✓							
CO3		✓		✓		✓						✓

Mapping of Course Outcomes (COs) with Program Specific Outcomes (PSO)

	PSO1	PSO2	PSO3	PSO4	PSO5
CO1		✓	✓		
CO2	✓		✓		✓
CO3		✓		✓	
CO4	✓				✓

	Teaching Plan	Year : 2024 2025 Semester : I / II

Bloom Levels: 1. Remember 2.Understand 3. Apply 4.Analysis 5. Create

No. of Lecture	Date	Topic / Sub - Topic	Course Outcome No. and Bloom Level	Refer (Text Book, Website) Page no. ____ to ____
1	6/9/22	Digital signals, digital circuits	1,2	M. M. Mano, Digital logic and Computer design
2	7/9/22	AND, OR, NOT, NAND, NOR and Exclusive-OR operations,	1,2	M. M. Mano, Digital logic and Computer design
3	12/9	Implementation of Logic Gates	1,2,3	M. M. Mano, Digital logic and Computer design
4	13/9	Boolean algebra	1,2	N.G.Palan,Digital Electronics
5	14/9	Number Systems	1,2	N.G.Palan,Digital Electronics
6	16/9	Number Systems	1,2	N.G.Palan,Digital Electronics
7	19/9	one's and two's complements arithmetic code	1,2	N.G.Palan,Digital Electronics
8	20/9	error detecting and correcting codes	1,2	N.G.Palan,Digital Electronics
9	21/9	Standard representation for logic functions	1,2	N.G.Palan,Digital Electronics
10	27/9	K-map representation	1,2	N.G.Palan,Digital Electronics

47	17/1	Timing diagrams and Execution Cycles	1,2	Ramesh Gaonkar
48	31/1	Memory Interfacing	1,2	Ramesh Gaonkar
49	1/2	Interrupts in 8085, 8085 Instruction Set and Programming:	1,2	Ramesh Gaonkar
50	1/2	Introduction to 8086, Microprocessor architecture,	1,2	Ramesh Gaonkar
51	2/2	Addressing modes, Instruction set and assembler directives,	1,2	Ramesh Gaonkar
52	2/2	Assembly language programming Memory Interfacing, I/O Interfacing,	1,2	Ramesh Gaonkar
53	3/2	Parallel communication interface, Serial communication interface,	1,2	Ramesh Gaonkar
54	3/2	D/A and A/D Interface, Timer, Keyboard /display controller	1,2	Ramesh Gaonkar
55	4/2	Interrupt controller, DMA controller Direct Memory Access (DMA),	1,2	Ramesh Gaonkar
56	4/2	C language programs, Assemblers and compilers, Programming and debugging tools.	1,2	Ramesh Gaonkar

Sign of Subject Teacher

Professor & Head
Department of Electronics &
Computer Engineering
P.E.S. College of Engineering
Nagsenvan,Chh. Sambhajinagar-431002

PROGRAM OUTCOMES:

After successful completion of the course the students will be well aware about the global level Electrical Engineering Technology. He will be able to use state of art electrical tech-wares (Hardware & Software) for analyzing the electrical engineering needs & problems to set the global level solutions.

PROGRAM EDUCATIONAL OUTCOMES:

Upon successful completion of four year course of B.Tech in Electrical Engineering the students will able to

- Understand and proficiently apply the relevant sciences and scientific methods to electrical engineering, to design solutions to complex problems in power system, electrical machines, and control techniques.
- Identify & synthesize the constraints posed by economic factors, safety considerations, environment impacts & professional standards on electrical engineering practice & use them for professional judgments in solving the critical field problems for sustainable technological development of nation.
- Determine, analyze & proficiently apply theoretical & numerical analysis of phenomena to conceive, control & optimize the performance of electrical engineering systems used for different applications such as transportation, automobile, process automation, and in navigation.
- Understand; proficiently apply a system approach for electrical system design and addressing the broad contextual constraints, leading to sustainable development of global level electrical technologies and standards.
- Develop and implement creative and innovative approaches to enhance the reliability, efficiency, and economical aspect of electrical systems for sustainable improvement of electrical technologies.
- Use all fundamental knowledge of electrical engineering, science and mathematics to plan, organize and use resources efficiently to reduce the adverse effect on environment.

ELECTRICAL ENGINEERING Department

COURSE OUTCOME:

Course SY EE	Course Outcome:
PART-I Engineering Mathematics-III	1. Students learn about the how to solve mathematical model with Laplace Transform and error functions and their applications. 2. Gain knowledge of Finite and Infinite Fourier Transforms and applications. 3. Familiarize with the concept of analytic function, C-R equations and its uses. 4. Learn about Cauchy's theorem and its uses in complex integration. Taylor's and Laurent's series in complex form. 5. Learn about Cauchy Residues theorem and contour integrations.
PART-I Network Analysis and Synthesis	1. To review basic components of electric network. 2. To design and develop network equations and their solutions. 3. To apply Laplace theorem for electric network analyses 4. To analyze AC circuit.
PART-I Fluid Mechanics and Thermal Engineering	1. To introduce properties of fluid and hydraulic measurement. 2 To understand dynamics of fluid flow. 3. To understand basic concepts of IC engines To understand concept of refrigeration and air conditioning
PART-I Measurement and Instrumentation	1. To understand philosophy of measurement. 2. To understand different methods analog and digital measurement. 3. To study principle of construction and operation of different transducer and dismay methods.
PART-I Electrical Engineering Materials	1. To study about crystal structure 2. To understand magnetic material structure. 3. To study about conducting and superconducting materials. 4. To study dielectric and Nano materials.
PART-I Basic Human Rights	1. To study concept of time value of money. 2. To study about demand in detail. 3.To understand Meaning of Production and factors of production. 4. To understand dif. Concept about market

ELECTRICAL Department ENGINEERING

PART-II Electrical Machine-I	1. To study diff. types, construction and operating principle of diff. types of electrical machines.
PART-II POWER SYSTEM-I	1. To Understand basic operation of power system. 2. To power system components and their characteristics. 3. To Understand basic Load and Energy survey.
PART-II Electrical Installation and Estimation	1. To prepare estimates and costing of electrical installations of power system. 2. To understand procedures of contracting and purchase
PART-II Numerical Methods and Programming	1. To study and understand MATLAB programming. 2. To review mathematical concepts. 3. To develop computer program for linear and nonlinear equations.
PART-II Product Design Engineering	1. Create simple mechanical or other designs 2. Create design documents for knowledge sharing 3. Manage own work to meet design requirements 4. Work effectively with colleagues
PART-II Solid State Devices	1. To study construction and characteristics of solid state devices. 2. To apply operational amplifier models in circuits employing negative feedback. 3. To design electronics circuit using Timer IC and voltage regulators. 4. To perform analysis of amplifiers using small signal models for the circuit elements. 5. To calculate the frequency response of circuits containing BJT, Op-Amp etc
PART-II Introduction to Non-Conventional energy sources	1. To review energy scenario. 2. To understand basic concepts , construction and operational features of different non-conventional sources

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Course TY EE	Course Outcome:
PART-I Electrical Machine-II	1. To study different methods of speed control of AC and DC motor. 2. To study importance and procedure of different performance test on AC and DC motor. 3. To determine different operating characteristics of AC and DC machines
PART-I Power System-II	1. To study different parameters of power system operation and control 2. To study load flow and Diff. methods of reactive power control. 3. To understand diff. methods of fault analysis and stability study
PART-I Microprocessor and micro Controller	1. To know the architecture of 8085 and 8051. 2. To understand interfacing and interrupt features of 8085 and 8051. 3. To develop program for basic applications.
PART-I Value Education, Human Rights and Legislative Procedures	1. To understand value of education and self-development. 2. To develop good values and character. 3. To know Human right and legislative procedure
PART-I Testing and Maintenance of Electrical equipment.	1. Follow safe practices to prevent accidents while using electrical equipment. 2. Prepare maintenance schedules for electrical equipment. 3. Maintain rotating electrical machines. 4. Maintain single phase and three phase transformers. 5. Maintain insulation systems of electrical equipment.
PART-I Power Plant Engineering.	1. To review basic components of power system, energy sources. 2. To understand principle of construction and operation of different conventional power plants

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PART-II Control System	1. To understand the behavior of nonlinear control system. 2. To design and analyze PID controller. 3. To understand and analyze state variable technique. 4. To design and analyze suitable control system for engineering application.
PART-II Principles of Electrical Machine Design	1. To understand principles of electric machine design. 2. To design different components of electric machine. 3. To design Transformer and understand CAD and use it for transformer design
PART-II Power Electronics	1. To review principle of construction, operation and characteristics of basic semiconductor devices. 2. To understand and analyze performance of controlled and uncontrolled converters. 3. To understand and analyze performance of DC to DC converters. Dc to AC converters. 4. To understand and analyze performance of AC voltage controllers.
PART-II Industrial automation and Control	1. To understand construction and working principle of different industrial measurement systems. 2. To understand new trends in industrial process control.
PART-II Switch Gear and Protection	1. To understand principles of protective relaying. 2. To understand principle of construction, operation and selection of different type of circuit breaker used in power system. 3. To understand different protection schemes used in power system operation

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Course BE EE	Course Outcome:
PART-I Power System Operation & Control	1. Explain the fundamental concept of power system. 2. Design the mathematical model of synchronous machine. 3. Design the mathematical model Excitation system and speed governing system. 4. Analyze the transient stability of power system using swing equation and equal area criteria. 5. Analyze the economic operation of power system. 6. Explain the methods of Voltage control.
PART-I High Voltage Engineering	1. Explain the breakdown process in solid, liquid, and gaseous materials 2. Analyze methods for generation and measurement of High Voltages and Currents (both ac and dc) 3. Describe the phenomenon of over-voltage and choose appropriate insulation coordination levels based on IS & IEC Standards.
PART-I Electrical Drives	1. Analyze the dynamics of Electrical Drives system. 2. Use various control techniques for controlling the speed of AC and DC motors. Analyze the AC and DC drives. 3. To Select/recommend the appropriate Drive according to the particular applications. State the recent technology of AC and DC drive
PART-I Special Purpose Electrical Machines	1. Demonstrate construction, working principle, and application of various types of special purpose electrical machines 2. Select a special Machine for a particular application 3. Demonstrate behavior of induction generator and induction machine.
PART-I HVDC Transmission and FACTS	1. To understand importance, configuration and types of HVDC transmission. 2. To analyst the operation of HVDC converter, system control and protection. 3. To understand the concept of FACTS, their role, type and functionality. 4. To analyze the operation of static series and shunt compensator

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PART-II Introduction To Industry 4.0 And Industrial Internet Of Things	1. Knowledge of theory and practice related to Industrial IoT Systems. 2. Ability to identify, formulate and solve engineering problems by using Industrial IoT. 3. Ability to implement real field problem by gained knowledge of Industrial applications with IoT capability.
PART-II Entrepreneurship Essentials	1.Evaluate an idea and assess the market 2. Explore the risks and rewards of entrepreneurship 3. Leverage experiments to validate concepts and refine your business strategy

PROGRAM SPECIFIC OUTCOMES (PSOS)

- Graduates will demonstrate the ability to apply fundamental knowledge of mathematics, science, and domain knowledge of electrical circuits, fields, control systems, machines, power systems, electronics, programming, power electronics and drives, modern software tools to understand, analyze and design electrical systems.
- Graduates will be responsible ethical professional with understanding of society linkages and sensitivity towards environment.
- Graduates will communicate effectively, contribute to the teams, assume leadership, manage project and finance effectively and adapt to the changing needs stepping into self and lifelong learning, will communicate effectively, contribute to the teams, assume leadership, manage project and finance effectively and adapt to the changing needs stepping into self and lifelong learning.

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