



S J P N Trust's

Hirasugar Institute of Technology, Nidasoshi.

Inculcating Values, Promoting Prosperity

Approved by AICTE, New Delhi, Permanently Affiliated to VTU, Belagavi

Recognized under 2(f) & 12B of UGC Act, 1956.

Accredited at 'A' Grade by NAAC & Programmes Accredited by NBA: CSE & ECE

Mech. Engg. Dept.

Academic

Course Outcome

AY: 2022-23

Course Outcomes of all the courses of 3rd semester

CBCS 2022 Scheme

III-SEM

Subject: Mechanics of Materials

Sub. Code: PCC - BME301

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Understand the concepts of stress and strain in simple and compound bars.
C201.2	Explain the importance of principal stresses and principal planes & analyze cylindrical pressure vessels under various loadings
C201.3	Apply the knowledge to understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
C201.4	Evaluate stresses induced in different cross-sectional members subjected to shear loads.
C201.5	Apply basic equation of simple torsion in designing of circular shafts & Columns

Subject: Manufacturing Process

Subject Code: IPCC- BME302

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Classify manufacturing process and elaborate the parts of casting process.
C202.2	Summarize the different casting process and select the melting furnace based on ferrous and non-ferrous alloys.
C202.3	Understand the classification of various forming process like forging, rolling, extrusion, wire drawing and sheet metal processes.
C202.4	List and explain different types of conventional welding processes like Arc and Gas welding processes
C202.5	Explain different special types of advance welding processes, soldering, brazing and adhesive bonding.

Subject: Material Science and Engineering

Subject Code: IPCC- BME303

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
C203.2	Understand the importance of phase diagrams and the phase transformations.
C203.3	Explain various heat treatment methods for controlling the microstructure.
C203.4	Correlate between material properties with component design and identify various kinds of defects.
C203.5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.



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Course Outcome

AY: 2022-23

Subject: Basic Thermodynamics

Subject Code: PCC- BME304

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
C204.2	Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers.
C204.3	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics
C204.4	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and Interpret the behaviour of pure substances and its application in practical problems.
C204.5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.

Subject: Introduction to Modelling and Design for Manufacturing

Subject Code: PCCL - BMEL305

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Create and modify a form-based design.
C205.2	Use design tools for moulded parts.
C205.3	Demonstrate proficiency in the setup and creation of a design.
C205.4	Simulate the assembly of machine components in 3D environment.

Subject: Smart Materials & Systems

Subject Code: ESC - BME306B

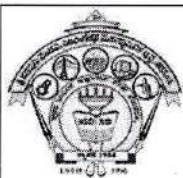
After successful completion of this course, the students will be able to;

CO	Description
C207.1	Understand, and apply the smart materials structure, components, stimuli-response for various applications and select and justify appropriate materials for specific applications
C207.2	Understand and analyze the basic principles, properties and classifications of various electrically activated materials and their applications and evaluate based on the stimuli and actuation
C207.3	Understand and analyze the basic principles, properties and classifications of various thermally activated materials and their applications and evaluate based on the stimuli and actuation
C207.4	Understand and analyze the basic principles, properties and classifications of various smart polymers and their applications and evaluate based on the stimuli and actuation
C207.5	Understand and analyze the basic principles, properties and classifications of various chemically activated materials and their applications and evaluate based on the stimuli and actuation



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Course Outcome

AY: 2022-23

Subject: Social Connect and Responsibility

Subject Code: UHV - BSCK307

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C210.2	Develop multicultural awareness and appreciation for Music and Drama by exposing learners to various forms of Art.
C210.3	Understand the concept of agricultural operations.
C210.4	Develop an eco-friendly relationship for saving the natural resources and preservation of nature.
C210.5	Describe the regional culinary practices and its importance in day-to-day life

Subject: Advanced Python Programming

Subject Code: AEC/ SEC - BME358A

After successful completion of this course, the students will be able to;

CO	Description
C211.1	Develop algorithmic solutions to simple computational problems
C211.2	Develop and execute simple Python programs.
C211.3	Use functions to decompose a Python program.
C211.4	Process compound data using Python data structures
C211.5	Utilize Python packages in developing software applications




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Course Outcome

AY: 2022-23

Course Outcomes of all the courses of 3rd semester to 5th semester**CBCS 2021 Scheme****III-SEM****Subject: Transform calculus, Fourier series and Numerical techniques****Sub. Code: BSC-21MAT31**

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
C201.2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
C201.3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems
C201.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
C201.5	Determine the externals of functional using calculus of variations and solve problems arising in dynamics of rigid bodies and vibration analysis.

Subject: Metal casting, Forming and Joining Processes**Subject Code: IPCC- 21ME32**

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Classify manufacturing process and elaborate the parts of casting process.
C202.2	Summarize the different casting process and select the melting furnace based on ferrous and non-ferrous alloys.
C202.3	Understand the classification of various forming process like forging, rolling, extrusion, wire drawing and sheet metal processes.
C202.4	List and explain different types of conventional welding processes like Arc and Gas welding processes.
C202.5	Explain different special types of advance welding processes, soldering, brazing and adhesive bonding.

Subject: Material Science and Engineering**Subject Code: IPCC-21ME33**

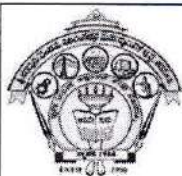
After successful completion of this course, the students will be able to;

CO	Description
C203.1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.
C203.2	Understand the importance of phase diagrams and the phase transformations.
C203.3	Know various heat treatment methods for controlling the microstructure.
C203.4	Correlate between material properties with component design and identify various kinds of defects.
C203.5	Apply the method of materials selection, material data and knowledge sources for computer-aided selection of materials.



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Course Outcome

AY: 2022-23

Subject: Thermodynamics

Subject Code: PCC-21ME34

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Understand basic biological principles and organizational structure of living systems at molecular level.
C204.2	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C204.3	Cause, symptoms, diagnosis and treatment of common diseases and evaluate the principles of design and development, for exploring novel bioengineering projects.
C204.4	Corroborate the concepts of biomimetics for specific requirements and biological problems that requires engineering expertise to solve them.
C204.5	Think critically towards exploring innovative bio based solutions for socially relevant problems.

Subject: Machine Drawing and GD & T

Subject Code: PCC-21MEL35

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Interpret the Machining and surface finish symbols on the component drawings.
C205.2	Draw true shape of sections of polyhedrons.
C205.3	Visualize and draw orthographic views of simple machine components, thread forms, fasteners, riveted, cotter, knuckle joints and couplings as per BIS.
C205.4	Visualize and prepare models of given detailed parts of machine component and its assembly with bill of materials and specifications.

Subject: Introduction to PYTHON

Subject Code: AEC-21ME381

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Demonstrate proficiency in handling of loops and creation of functions
C210.2	Identify the methods to create and manipulate lists, tuples and dictionaries
C210.3	Discover the commonly used operations involving regular expressions and file system
C210.4	Examine working of PDF and word file formats



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Course Outcome

AY: 2022-23

IV-SEM**Subject: Complex Analysis, Probability and Linear Programming. Subject Code: BSC-21ME41**

After successful completion of this course, the students will be able to;

CO	Description
C213.1	Use the concepts of an analytic function and complex potentials to solve the problems arising in fluid flow.
C213.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
C213.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
C213.4	Analyze and solve Linear Programming models of real life situations and solve LPP by the simplex method
C213.5	Learn techniques to solve Transportation and Assignment Problems

Subject: Machining Science and Jigs & Fixtures**Subject Code: IPCC-21ME42**

After successful completion of this course, the students will be able to;

CO	Description
C214.1	Explain the construction & specification of various machine tools.
C214.2	Discuss different cutting tool materials, tool nomenclature & surface finish.
C214.3	Apply mechanics of machining process to evaluate machining time.
C214.4	Understand the concepts of different advanced machining processes
C214.4	Discuss the importance of Jigs and Fixtures

Subject: Fluid Mechanics**Subject Code: IPCC-21ME43**

After successful completion of this course, the students will be able to;

CO	Description
C215.1	Understand the basic principles of fluid mechanics and fluid kinematics
C215.2	Acquire the basic knowledge of fluid dynamics and flow measuring instruments
C215.3	Understand the nature of flow and flow over bodies and the dimensionless analysis
C215.4	Acquire the compressible flow fundamental and basics of CFD packages and the need for CFD analysis
C215.5	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties

Subject: Mechanics of Materials**Subject Code: PCC-21ME44**

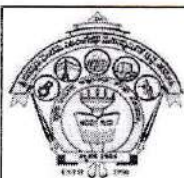
After successful completion of this course, the students will be able to;

CO	Description
C216.1	Understand simple, compound, thermal stresses and strains their relations and strain energy.
C216.2	Analyze structural members for stresses, strains and deformations.
C216.3	Analyze the structural members subjected to bending and shear loads
C216.4	Analyze shafts subjected to twisting loads.
C216.5	Analyze the short columns for stability.



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Course Outcome

AY: 2022-23

Subject: Biology For Engineers

Subject Code: AEC-21BE45

After successful completion of this course, the students will be able to;

CO	Description
C217.1	Understand basic biological principles and organizational structure of living systems at molecular level.
C217.2	Elucidate the basic biological concepts via relevant industrial applications and case studies.
C217.3	Cause, symptoms, diagnosis and treatment of common diseases and evaluate the principles of design and development, for exploring novel bioengineering projects.
C217.4	Corroborate the concepts of biomimetics for specific requirements and biological problems that requires engineering expertise to solve them.
C217.5	Think critically towards exploring innovative biobased solutions for socially relevant problems.

Subject: Mechanical Measurements and Metrology Lab

Subject Code: PCC -21MEL46

After successful completion of this course, the students will be able to;

CO	Description
C218.1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer.
C218.2	To measure angle using Sine Center/ Sine Bar/ Bevel Protractor, alignment using Autocollimator/ Roller set.
C218.3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
C218.4	To measure cutting tool forces using Lathe/Drill tool dynamometer.
C218.5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer
C218.6	To measure surface roughness using Tally Surf/ Mechanical Comparator

Subject: Introduction to AI and ML

Subject Code: AEC-21ME482

After successful completion of this course, the students will be able to;

CO	Description
C220.1	To familiarize basic principles, and applications of AI
C220.2	To guide the students on generalization as a means to capturing patterns in the data
C220.3	To demonstrate the reasoning to internal representations of knowledge.
C220.4	To make to understand the of challenges in Artificial Intelligence domain
C220.5	To acquaint with the future trends of Artificial Intelligence.



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Course Outcome

AY: 2022-23

V-SEM

Subject: Theory of Machines

Subject Code: BSC -21ME51

After successful completion of this course, the students will be able to;

CO	Description
C301.1	Knowledge of mechanisms and their motion and the inversions of mechanisms
C301.2	Analyse the velocity, acceleration of links and joints of mechanisms..
C301.3	Analyse the mechanisms for static and dynamic equilibrium.
C301.4	Carry out the balancing of rotating and reciprocating masses and also analyse different types of governors used in real life situation.
C301.5	Analyze the free and forced vibration phenomenon.

Subject: Thermo-fluids Engineering

Subject Code: IPCC -21ME52

After successful completion of this course, the students will be able to;

CO	Description
C302.1	Apply the concepts of testing of I. C. Engines and evaluate their performance, and evaluate the performance of Reciprocating compressor.
C302.2	Apply and analyse the concepts related to Refrigeration and Air conditioning, and get conversant with Psychrometric Charts, Psychrometric processes, human comfort conditions.
C302.3	Explain the construction, classification and working principle of the Turbo machines and apply of Euler's turbine equation to evaluate the energy transfer and other related parameters. Compare and evaluate the performance of positive displacement pumps.
C302.4	Classify, explain and analyse the various types of hydraulic turbines and centrifugal pumps.
C302.5	Classify, explain and analyse various types of steam turbines and centrifugal compressor.

Subject: Finite Element Analysis

Subject Code: IPCC -21ME53

After successful completion of this course, the students will be able to;

CO	Description
C303.1	Understand the concepts behind formulation methods in FEM and Choose interpolation polynomial equation for simplex elements
C303.2	Develop element characteristic equation and solve the global equation of FEA elements such as bars and trusses.
C303.3	Develop element characteristic equation and solve the global equation of FEA for beams and circular shafts
C303.4	Develop element characteristic equation and solve the global equation of FEA for 1D heat transfer and fluid flow
C303.5	Develop element characteristic equation and solve the global equation of FEA for axi symmetric and dynamic problems



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Course Outcome

AY: 2022-23

Subject: Modern Mobility and Automotive Mechanics

Subject Code: PCC -21ME54

After successful completion of this course, the students will be able to;

CO	Description
C304.1	To identify the different parts of an automobile and its working
C304.2	Understand the working of different systems employed in automobile
C304.3	Analyse the limitation of present day automobiles
C304.4	Evaluate the energy sources suitability
C304.5	Apply the knowledge for selection of automobiles based on their suitability

Subject: Design lab

Subject Code: PCC -21MEL55

After successful completion of this course, the students will be able to;

CO	Description
C305.1	Compute the natural frequency of the free and forced vibration of single degree freedom systems, critical speed of shafts.
C305.2	Carry out balancing of rotating masses.
C305.3	Analyse the governor characteristics.
C305.4	Study the effect of gyroscopic couple on plane disc
C305.5	Determine stresses in disk, beams, plates and hook using photo elastic bench
C305.6	Determination of Pressure distribution in Journal bearing
C305.7	Analyze the stress and strains using strain gauges in compression and bending test and stress distribution in curved beams.
C305.8	To realize different mechanisms and cam motions

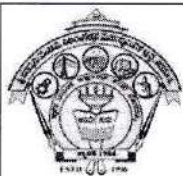
Subject: Research Methodology & Intellectual Property Rights

Subject Code: AEC -21RMI56

After successful completion of this course, the students will be able to;

CO	Description
C306.1	To know the meaning of engineering research.
C306.2	To know the procedure of Literature Review and Technical Reading.
C306.3	To know the fundamentals of patent laws and drafting procedure.
C306.4	Understanding the copyright laws and subject matters of copyrights and designs.
C306.5	Understanding the basic principles of design rights.





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Course Outcome

AY: 2022-23

Subject: Environmental Studies

Subject Code: HSMC -21CIV57

After successful completion of this course, the students will be able to;

CO	Description
C307.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C307.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C307.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C307.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C307.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.

Subject: Basics of MATLAB

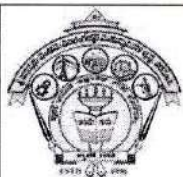
Subject Code: AEC -21ME581

After successful completion of this course, the students will be able to;

CO	Description
C308.1	Able to implement loops, branching, control instruction and functions in MATLAB programming environment.
C308.2	Able to program curve fitting, numerical differentiation and integration, solution of linear equations in MATLAB and solve electrical engineering problems.
C308.3	Able to understand implementation of ODE using ode 45 and execute Solutions of nonlinear equations and DFT in MATLAB.
C308.4	Able to simulate MATLAB Simulink examples




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Course Outcome

AY: 2022-23

Course Outcomes of all the courses of 3rd semester to 8th semester**CBCS 2018 Scheme****III-SEM****Subject: Transform calculus, Fourier series and Numerical techniques Sub. Code: 18MAT31**

After successful completion of this course, the students will be able to;

CO	Description
C201.1	Know the use of periodic signals and Fourier series to analyze circuits and system communications.
C201.2	Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform
C201.3	Employ appropriate numerical methods to solve algebraic and transcendental equations.
C201.4	Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems.
C201.5	Determine the external of functional and solve the simple problems of the calculus of variations.

Subject: Mechanics of Materials**Subject Code: 18ME32**

After successful completion of this course, the students will be able to;

CO	Description
C202.1	Appreciate the concepts of stress, strain, Hooks law, evaluation of deformations in axially loaded bars, Elastic constants and thermal stresses
C202.2	Determine components of stresses on inclined plane at a point subjected to plane stress system by analytically and graphically and stresses induced in pressure vessels.
C202.3	Determine shear forces, bending moments, bending stresses and deflections at all sections of beam subjected to transverse load and couples.
C202.4	Determine the dimensions of shafts based on torsional strength, rigidity and flexibility and also elastic stability of columns using Euler's and Rankin's theory.
C202.5	Explain the concept of strain energy, Castiglione's theorem, Theories of failures and evaluate lateral deflections in beams using strain energy theory.

Subject: Basic Thermodynamics**Subject Code: 18ME33**

After successful completion of this course, the students will be able to;

CO	Description
C203.1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
C203.2	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics.
C203.3	Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers and change in properties.
C203.4	Interpret the behavior of pure substances and its application in practical problems.
C203.5	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.



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Course Outcome

AY: 2022-23

Subject: Material Science

Subject Code: 18ME34

After successful completion of this course, the students will be able to;

CO	Description
C204.1	Describe the mechanical properties of metals, their alloys and various modes of failure.
C204.2	Understand the microstructures of ferrous and non-ferrous materials to mechanical properties.
C204.3	Explain the processes of heat treatment of various alloys.
C204.4	Understand the properties and potentialities of various materials available and material selection procedures.
C204.5	Understand composite materials and their processing as well as applications.

Subject: Metal casting and welding

Subject Code: 18ME35A/18ME45A

After successful completion of this course, the students will be able to;

CO	Description
C205.1	Classify manufacturing process and elaborate the parts of casting process.
C205.2	Categorize the different casting process and select the melting furnace based on ferrous and non-ferrous alloys.
C205.3	Explain the solidification, gasification, casting defects and different methods to achieve directional solidification.
C205.4	Understand and make use of different conventional welding processes.
C205.5	Analyze structure of weld and explain soldering, brazing and NDT.

Subject: Machine Tools Operations

Subject Code: 18ME35B/18ME45B

After successful completion of this course, the students will be able to;

CO	Description
C206.1	Classify and demonstrate basic working of all the machine tools.
C206.2	Explain the different types of relative motions in machining process
C206.3	Explain cutting tool materials, tool geometry, and surface finish and make use of machining equations for cutting operations.
C206.4	Analyze the different mechanics of machining process.
C206.5	Appreciate the concept of tool wear, tool life and economics of machining processes with simple numerical

Subject: Computer Aided Machine Drawing

Subject Code: 18ME36A/18ME46A

After successful completion of this course, the students will be able to;

CO	Description
C207.1	Have hands on experience on mechanical modeling software.
C207.2	Draw true shape of sections of polyhedrons.
C207.3	Visualize and draw orthographic views of simple machine components, thread forms, fasteners, riveted, cotter, knuckle joints and couplings as per BIS.
C207.4	Visualize and prepare models of given detailed parts of machine component and its assembly with bill of materials and specifications.

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Course Outcome

AY: 2022-23

Subject: Mechanical measurements and metrology

Subject Code: 18ME36B/18ME46B

After successful completion of this course, the students will be able to;

CO	Description
C208.1	Illustrate the principle of operation and calibration of an instrument and Compare engineering measuring instruments for a particular application
C208.2	Understand the concepts of limits, fits, tolerance and make use of measuring instruments.
C208.3	Make use of concepts of interferometer and screw thread measurement methods.
C208.4	Explain the concepts of measurement, measurement systems and intermediate modifying devices
C208.5	Interpret the working of force, torque, pressure, strain and Temperature measuring devices

Subject: Material Testing Lab

Subject Code: 18MEL37A/18MEL47A

After successful completion of this course, the students will be able to;

CO	Description
C209.1	Demonstrate the applications of metallography and material science.
C209.2	Select the standard experiments to determine the mechanical properties of different materials using UTM, torsion test, fatigue test, hardness test, wear test and impact test.
C209.3	Identify and compare the structure of the materials using metallurgical microscope.
C209.4	Identify the flaws or defects of materials using NDT methods.
C209.5	Modify the properties of metal specimens by heat treatment processes.

Subject: Mechanical Measurements and Metrology Lab

Subject Code: 18MEL37B/47B

After successful completion of this course, the students will be able to;

CO	Description
C210.1	Select the set of combination of slip gauge height based on given dimensions.
C210.2	Calibrate the Thermocouple, Load cell and LVDT to measure physical quantities.
C210.3	Find major and minor diameters using Two or Three wire method and Angle of screw thread using Toolmaker's microscope.
C210.4	Measure slope or angle of the given work piece using Sine bar, Sine center and Bevel protractor.
C210.5	Measure width and height of gear tooth at pitch circle diameter using Gear tooth vernier calipers



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Course Outcome

AY: 2022-23

Subject: Workshop and Machine Shop Practice

Subject Code: 18MEL38A/18MEL48A

After successful completion of this course, the students will be able to;

CO	Description
C211.1	Able to prepare fitting models according to drawings using fitting tools
C211.2	Able to carry out any kind of operation on Machine tools (Lathe)
C211.3	Capable of preparing various types of jobs accurately to the given dimensions.
C211.4	Able to perform groove cutting and gear cutting operations.

Subject: Foundry, Forging and Welding lab

Subject Code: 18MEL38B/18MEL48B

After successful completion of this course, the students will be able to;

CO	Description
C212. 1	Demonstrate the applications of basic of Foundry and Forging processes.
C212. 2	Experiment with molding sand to determine tensile, compression and Shear strength of Sand Specimen by USTM.
C212. 3	Evaluate the sand properties by conducting permeability, clay content and sieve analysis tests.
C212. 4	Apply sand molding process through preparation of moulds using two molding boxes with or without patterns.
C212. 5	Determine the length of the raw material required and create the forging models involving upsetting, drawing and bending operations.



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Academic

Course Outcome

AY: 2022-23

IV-SEM

Subject: Mathematics

Subject Code: 18MAT41

After successful completion of this course, the students will be able to;

CO	Description
C216.1	Solve first and second order ordinary differential equations by using appropriate numerical methods.
C216.2	Explain the idea of analyticity, potential field's residues and poles of complex potentials in field theory and electromagnetic theory.
C216.3	Solve Engineering problems using complex variable techniques
C216.4	Explain the basic concepts of probability, random variables, probability distribution and joint probability distribution.
C216.5	Analyze and Evaluate scientific hypotheses using rigorous statistical methods.

Subject: Applied thermodynamics

Subject Code: 18ME42

After successful completion of this course, the students will be able to;

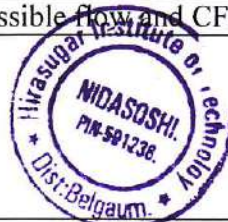
CO	Description
C217.1	Recall thermodynamic concepts to analyze the performance of I C engine and gas power cycles including propulsion systems.
C217.2	Analyze Rankine cycle for the improvement in performance of steam power plant.
C217.3	Perform the Combustion analysis of fuels or flue gases and Conduct the performance analysis of I.C. Engines.
C217.4	Compare the working principles and applications of different refrigeration systems and evaluate the psychometric properties of air conditioning systems.
C217.5	Explain the thermodynamic analysis of reciprocating air compressors and function of steam nozzle.

Subject: Fluid Mechanics

Subject Code: 18ME43

After successful completion of this course, the students will be able to;

CO	Description
C218.1	Define and formulate the properties of fluids, fluid statics and effect of buoyancy.
C218.2	Interpret and apply the principles of fluid kinematics and dynamics, fluid flow measuring devices.
C218.3	Formulate the correlations for the different fluid flows and analysis of different losses during the flow.
C218.4	Analyze the flow over bodies and dimensional analysis.
C218.5	Understand the basic concepts of compressible flow and CFD.



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Course Outcome

AY: 2022-23

Subject: Kinematics of Machines

Subject Code: 18ME44

After successful completion of this course, the students will be able to;

CO	Description
C219.1	Identify mechanisms with basic understanding of motion.
C219.2	Comprehend velocity and acceleration analysis of planar mechanisms using graphical method, Instantaneous Center Method and Klein's Construction
C219.3	Comprehend velocity and acceleration analysis of planar mechanisms using analytical method
C219.4	Define gear terminology and identify types of gear, law of gearing, interference and examine gear trains for velocity ratio, tooth load and torque by algebraic and tabular column methods.
C219.5	Carry out motion analysis of cam profiles by analytical and graphical methods.




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Academic

Course Outcome

AY: 2022-23

V-SEM

Subject: Management and Economics

Subject Code: 18ME51

After successful completion of this course, the students will be able to;

CO	Description
C301.1	Understand needs, functions, roles, scope and evolution of Management
C 301.2	Understand importance, purpose of Planning and hierarchy of planning and also analyze its types
C 301.3	Discuss Decision making, Organizing, Staffing, Directing and Controlling
C 301.4	Select the best economic model from various available alternatives
C 301.5	Understand various interest rate methods and implement the suitable one.

Subject: Design of Machine Elements-I

Subject Code: 18ME52

After successful completion of this course, the students will be able to;

CO	Description
C302.1	Explain phases of design process, mechanical behavior & selection of engineering materials, its codes & standards and stress concentration in machine elements.
C302.2	Determine the behavior of machine components under impact and fatigue loading.
C302.3	Design keys, shafts, joints and couplings.
C302.4	Design of riveted and welded joints.
C302.5	Design of threaded fasteners and power screws

Subject: Dynamics of Machines

Subject Code: 18ME53

After successful completion of this course, the students will be able to;

CO	Description
C303.1	Determine the forces and couples for static and dynamic conditions of four bar and slider crank mechanisms to keep the system in equilibrium.
C303.2	Determine magnitude and angular position of balancing masses under static and dynamic condition of rotating and reciprocating masses in same and different planes.
C303.3	Determine sensitiveness, isochronism, effort and power of porter and hartnell governors.
C303.4	Determine gyroscopic couple and effects related to 2, 4 wheeler, plane disc, ship and aero planes.
C303.5	Understand types of vibration, SHM and methods of finding natural frequencies of simple mechanical systems.



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Course Outcome

AY: 2022-23

Subject: Turbo Machines

Subject Code: 18ME54

After successful completion of this course, the students will be able to;

CO	Description
C304.1	Model studies and thermodynamics analysis of turbo machines.
C304.2	Analyze the energy transfer in Turbo machine with degree of reaction and utilization factor.
C304.3	Classify, analyze and understand various type of steam turbine.
C304.4	Classify, analyze and understand various type of hydraulic turbine.
C304.5	Understand the concept of radial power absorbing machine and the problems involved during its operation.

Subject: Fluid Power Engg.

Subject Code: 18ME55

After successful completion of this course, the students will be able to;

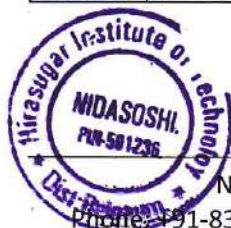
CO	Description
C305.1	Identify and analyze the functional requirements of a fluid power transmission system for a given application
C305.2	Visualize how a hydraulic/pneumatic circuit will work to accomplish the function
C305.3	Design an appropriate hydraulic or pneumatic circuit or combination circuit like electro-hydraulics, electro-pneumatics for a given application.
C305.4	Select and size the different components of the circuit
C305.5	Develop a comprehensive circuit diagram by integrating the components selected for the given application

Subject: Operations Management

Subject Code: 18ME56

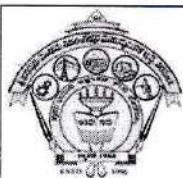
After successful completion of this course, the students will be able to;

CO	Description
C306.1	Explain the concept and scope of operations management in a business context
C306.2	Recognize the role of Operations management among various business functions and its role in the organizations' strategic planning and gaining competitive advantage.
C306.3	Analyze the appropriateness and applicability of a range of operations management systems/models in decision making.
C306.4	Assess a range of strategies for improving the efficiency and effectiveness of organizational operations.
C306.5	Evaluate a selection of frameworks used in the design and delivery of operations



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Course Outcome

AY: 2022-23

Subject: Fluid Mechanics and Machinery lab

Subject Code: 18MEL57

After successful completion of this course, the students will be able to;

CO	Description
C307.1	Perform experiments to determine the coefficient of discharge of flow measuring devices.
C307.2	Conduct experiments to measure the loss of head in flow through pipes.
C307.3	Determine the force exerted by a jet on different geometry vanes
C307.4	Test basic performance parameters of hydraulic turbines and pumps and execute the knowledge in real life situations.
C307.5	Conduct the performance of reciprocating Air compressor and Air blower

Subject: Energy Conversion Lab

Subject Code: 18MEL58

After successful completion of this course, the students will be able to;

CO	Description
C308.1	Perform experiments to determine the properties of fuels and oils.
C308.2	Conduct experiments on engines and draw characteristics.
C308.3	Test basic performance parameters and the energy flow pattern of I.C. Engine and implement the knowledge in industry.
C308.4	Estimate exhaust emission, factors affecting them and report the remedies.
C308.5	Exhibit his competency towards preventive maintenance of IC engines

Subject: Environmental Studies

Subject Code: 18CIV59

After successful completion of this course, the students will be able to;

CO	Description
C309.1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
C309.2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
C309.3	Demonstrate ecology knowledge of a complex relationship between biotic and abiotic components.
C309.4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
C309.5	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.




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Course Outcome

AY: 2022-23

VI-SEM

Subject: Finite Element Analysis

Subject Code: 18ME61

After successful completion of this course, the students will be able to;

CO	Description
C310.1	Understand the concepts behind formulation methods in FEM and Choose interpolation polynomial equation for simplex elements
C310.2	Develop element characteristic equation and solve the global equation of FEA elements such as bars and trusses.
C310.3	Develop element characteristic equation and solve the global equation of FEA for beams and circular shafts
C310.4	Develop element characteristic equation and solve the global equation of FEA for 1D heat transfer and fluid flow
C310.5	Develop element characteristic equation and solve the global equation of FEA for axis symmetric and dynamic problems

Subject: Design of Machine Element-II

Subject Code: 18ME62

After successful completion of this course, the students will be able to;

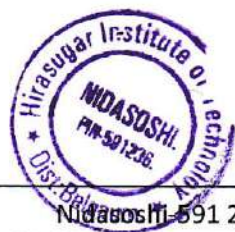
CO	Description
C311.1	Design and analyze behaviour of stresses in curved beams and compound cylinders.
C311.2	Design belts, wire ropes and chain drives & springs for Mechanical systems
C311.3	Design different types of gears and simple gear boxes for different applications.
C311.4	Design brakes and clutches
C311.5	Select suitable lubricants and analyze performance of hydrodynamic, hydrostatic and antifriction bearings.

Subject: Heat Transfer

Subject Code: 18ME63

After successful completion of this course, the students will be able to;

CO	Description
C312.1	Understand the modes of heat transfer and apply the basic laws to formulate engineering systems.
C312.2	Understand and apply the basic laws of heat transfer to extended surface, composite material and unsteady state heat transfer problems.
C312.3	Analyze heat conduction through numerical methods and apply the fundamental principle to solve radiation heat transfer problems.
C312.4	Analyze heat transfer due to free and forced convective heat transfer.
C312.5	Understand the design and performance analysis of heat exchangers and their practical applications, Condensation and Boiling phenomena.



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Course Outcome

AY: 2022-23

Subject: Non Traditional Machining**Subject Code: 18ME641**

After successful completion of this course, the students will be able to;

CO	Description
C313.1	Understand and compare traditional and non-traditional machining process and recognize the need for Non-traditional machining process.
C313.2	Understand the constructional features, performance parameters, process characteristics, applications, advantages and limitations of USM, AJM and WJM.
C313.3	Understand chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages and limitations.
C313.4	Understand the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM.
C313.5	Understand the LBM equipment, LBM parameters, and characteristics. EBM equipment and mechanism of metal removal, applications, advantages and limitations LBM & EBM.

SUB: PLC & SCADA**Sub Code: 18EE652**

After successful completion of this course, the students will be able to;

CO	Description
C319.1	Summarize the history, features, hardware, memory organization and basic programming with respect to PLC.
C319.2	Explain basic relay instruction operation and converting narrative expression to Ladder Diagrams.
C319.3	Explain Timer Instructions in PLC and I am able to describe Counter Instructions and Program Control Instructions of PLC.
C319.4	Discuss the execution of data transfer instructions, data compare instructions, arithmetic instructions and the basic operation of PLC closed-loop control system.
C319.5	Describe sequencer, bit shift register and SCADA in conjunction with PLC.

Subject: PROGRAMMING IN JAVA**Subject Code: 18CS653**

After successful completion of this course, the students will be able to;

CO	Description
C320.1	Explain the object-oriented concepts and JAVA.
C320.2	Develop computer programs to solve real world problems in Java.
C320.3	Develop simple GUI interfaces for a computer program to interact with users.



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Course Outcome

AY: 2022-23

SUB: Computer Aided Modeling and Analysis Lab**Sub Code: 18MEL66**

After successful completion of this course, the students will be able to;

CO	Description
C323.1	Demonstrate the basic features of an analysis package.
C323.2	Use the modern tools to formulate the problem, and able to create geometry, describe, apply boundary condition to solve problems of bars, truss, beams, plate to find stress with different loading conditions.
C323.3	Demonstrate the deflection of beams subjected to point, uniformly distributed and varying loads further to use the available results to draw shear force and bending moment diagrams.
C323.4	Analyze the given problem by applying basic principle to solve and demonstrate 1D and 2D heat transfer with conduction and convection boundary conditions.
C323.5	Carry out dynamic analysis and finding natural frequencies for various boundary conditions and also analyze with forcing function.

SUB: Heat Transfer Lab**Sub Code: 18MEL67**

After successful completion of this course, the students will be able to;

CO	Description
C324.1	Perform experiments to determine the thermal conductivity of a metal rod
C324.2	Conduct experiments to determine convective heat transfer coefficient for free and forced convection and correlate with theoretical values.
C324.3	Estimate the effectiveness and efficiency in pin-fin
C324.4	Determine the emissivity of the given test plate and Prove Stefan Boltzmann law of radiation.
C324.5	Conduct and measure the overall heat transfer coefficient, effectiveness of parallel and counter flow heat exchangers.
C324.6	Estimate the heat transfer coefficient for film wise and drop wise condensation processes.
C324.7	Demonstrate the working of Refrigeration and Air-conditioning system.
C324.8	Calculate temperature distribution of study and transient heat conduction through plane wall, cylinder and fin using numerical approach.

SUB: Mini-Project**Sub Code: 18MEM68**

After successful completion of this course, the students will be able to;

CO	Description
C325.1	Practice acquired knowledge within the chosen area of technology for project development.
C325.2	Identify the technical aspects of the chosen project
C325.3	Work as an individual or in a team in development of technical projects.
C325.4	Communicate and report effectively project related activities and findings.

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Course Outcome

AY: 2022-23

VII-SEM**Subject: Control Engineering****Subject Code: 18ME71**

After successful completion of this course, the students will be able to;

CO	Description
C401.1	Recognize control system and its types, control action, and determine the system governing equations for physical models (Electrical, Thermal, Mechanical, Electro Mechanical).
C401.2	Estimate the response and error in response of first and second order systems subjected standard input signals.
C401.3	Calculate the gain of the system using block diagram and signal flow graph for a given application.
C401.4	Analyze a linear feedback control system for stability using Routh's criterion and root Locus technique in complex domain.
C401.5	Analyze the stability of linear feedback control systems in frequency domain using polar plots, Nyquist and Bode plots.

Subject: Computer Aided Design and Manufacturing**Subject Code: 18ME72**

After successful completion of this course, the students will be able to;

CO	Description
C402.1	Define Automation, CIM, CAD, CAM and explain the differences between these concepts. And Explain the basics of automated manufacturing industries through mathematical models and analyze different types of automated flow lines
C402.2	Solve simple problems of transformations of entities on computer screen and Categorize CAPP, MRP, PPC and CRP in Manufacturing system
C402.3	Understand the overall FMS and Solve the manual assembly line balancing problem
C402.4	Explain the use of different computer applications in manufacturing, and prepare part programs for simple jobs on CNC machine tools and robot programming.
C402.5	Visualize and appreciate the modern trends in Manufacturing like additive manufacturing, Industry 4.0 and applications of Internet of Things leading to Smart Manufacturing

SUB: Total Quality Management**Sub Code: 18ME734**

After successful completion of this course, the students will be able to;

CO	Description
C406.1	Explain the various approaches of TQM and QMS.
C406.2	Identify the role of leader & leadership styles which helps for their future.
C406.3	Explain the methods to satisfy the customer, employee involvement and motivation techniques.
C406.4	Apply statistical tools for continuous improvement of quality systems
C406.5	Apply the tools and technique for effective implementation of TQM



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Course Outcome

AY: 2022-23

Subject: Mechatronics**Subject Code: 18ME754**

After successful completion of this course, the students will be able to;

CO	Description
C411.1	Explain the basics of theory, operation, design and application of sensors and actuators.
C411.2	Explain the basics of architecture, programming and application of microcontrollers and microprocessors.
C411.3	Explain the PLC, basic structure, principle of operations and integration of different elements
C411.4	Apply knowledge of mechanical & electrical actuation systems.
C411.5	Explain the pneumatic and hydraulic actuation system

Subject: CIM LAB**Subject Code: 18MEL76**

After successful completion of this course, the students will be able to;

CO	Course Outcome
C417. 1	Appreciate NC & CNC machines & its practical use in industry.
C417. 2	Distinguish between absolute & incremental coordinate system.
C417. 3	Make use of computer assisted part programming software to perform milling, drilling and turning operations in design, simulation and manufacturing.
C417. 4	Write manual part programs for milling, turning operations.
C417. 5	Explain what is FMS & ASRS
C417. 6	Develop the robot program by using basic commands.
C417. 7	Read and explain Hydraulics & Pneumatic circuits.

Subject: Design Lab**Subject Code: 18MEL77**

After successful completion of this course, the students will be able to;

CO	Description
C418.1	To understand the working principles of machine elements such as Governors, Gyroscopes etc
C418.2	To identify forces and couples in rotating mechanical system components
C418.3	To identify vibrations in machine elements and design appropriate damping methods and to determine the critical speed of a rotating shaft
C418.4	To measure strain in various machine elements using strain gauges
C418.5	To determine the minimum film thickness, load carrying capacity, frictional torque and pressure distribution of journal bearing



Chop
Head of the Dept.
Mechanical Engg.
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Inculcating Values, Promoting Prosperity

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Mech. Engg. Dept.

Academic

Course Outcome

AY: 2022-23

VIII-SEM

Subject: Energy Engineering

Subject Code: 18ME81

After successful completion of this course, the students will be able to;

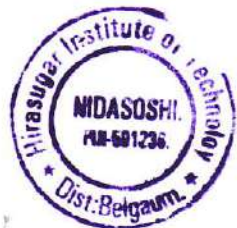
CO	Course Outcome
C420.1	Understand the construction and working of steam generators and their accessories.
C420.2	Identify solar and biomass renewable energy sources and their utilization.
C420.3	Understand principles of energy conversion from alternate sources including wind, geothermal and tidal.
C420.4	Understand principles of energy conversion from alternate sources including Ocean and hydel.
C420.5	Understand principles of energy conversion from Nuclear energy source.

Subject: Automobile Engineering

Subject Code: 18ME824

After successful completion of this course, the students will be able to;

CO	Course Outcome
C424.1	To identify the different parts of an automobile and it's working
C424.2	To understand the working of transmission and braking systems
C424.3	To comprehend the working of steering and suspension systems
C424.4	To learn various types of fuels and injection systems
C424.5	To know the cause of automobile emission, its effects on environment and methods to reduce the emissions.




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