COURSE STRUCTURE & SYLLABUS

FOR

M.Tech

CAD/CAM

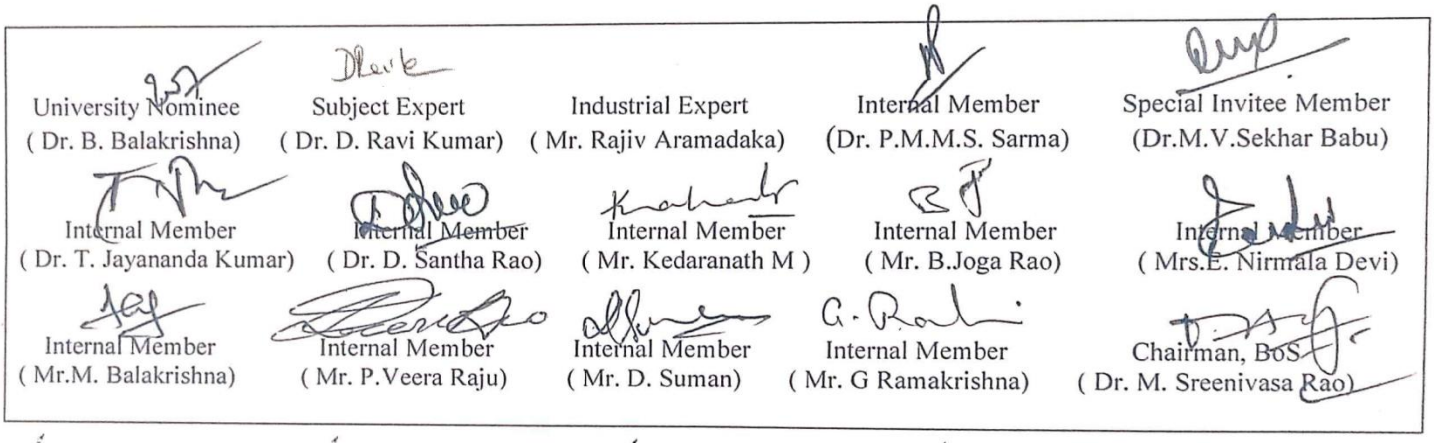
(Applicable for Batches Admitted from 2020 - 2021)

Godavari institute of Engg& Technology

Approved By AICTE NAAC'A^{+}' Grade Recognized by UCG,U/Sec.2(f)&12(B) Permanent affiliation by JNTUK
GIET Campus, Chaitanya Knowledge city,NH-16,Rajahmundry,East Godavari, A.P.
Tel:+91-883-2484828-31www.giet.ac.in

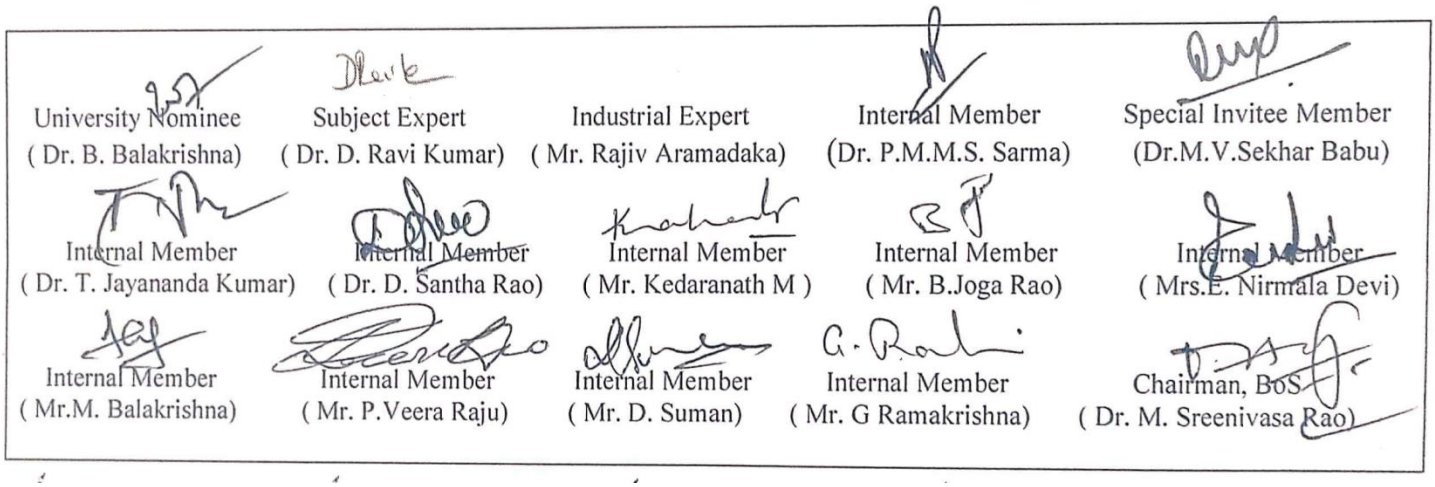
I SEMESTER

S.No	Course Code	Category	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total
1	20231101	PC	Geometric Modeling	3	0	0	3	30	70	100
2	20231102	PC	Computer Aided Manufacturing	3	0	0	3	30	70	100
3		PE	**Program Elective – 1**	3	0	0	3	30	70	100
	20231164A		Computational Methods in Engineering							
	20231164B		Composite Materials							
	20231164C		Industrial Robotics							
4		PE	**Program Elective – 2**	3	0	0	3	30	70	100
	20231165A		Mechatronics							
	20231165B		Mechanical Vibrations							
	20231165C		Product Design and Development							
5	20231103	CC	Research Methodology	2	0	0	2	30	70	100
6	20201111	LB	Advanced CAD Lab	0	0	4	2	30	70	100
7	20231112	LB	Manufacturing Lab	0	0	4	2	30	70	100
8		AC	**Audit Course –I**	2	0	0	0	30	70	100
	20231196		English for Research Paper Writing							
	20231196a		Disaster Management							
	20231196b		Value Education							
			Total	**16**	**0**	**8**	**18**	**240**	**560**	**800**



II SEMESTER

S. No	Course Code	Category	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total
1	20231201	PC	Optimization & Reliability	3	0	0	3	30	70	100
2	20231202	PC	Advanced Manufacturing Processes	3	0	0	3	30	70	100
3		PE	**Program Elective – 3**	3	0	0	3	30	70	100
	20231263A		Additive Manufacturing							
	20231263B		Hydraulic and Pneumatic Systems							
	20231263C		Modeling and Simulation of Manufacturing Systems							
4		PE	**Program Elective – 4**	3	0	0	3	30	70	100
	20231264A		Materials Characterization Techniques							
	20231264B		Automation in Manufacturing							
	20231264C		Finite Element Method							
5	20231211	LB	Simulation of Manufacturing Lab	0	0	4	2	30	70	100
6	20231212	LB	Material Characterization Lab	0	0	4	2	30	70	100
7	20231221	MP	Mini Project With Seminar	2	0	0	2	100	--	100
8		AC	**Audit Course –II**	2	0	0	0	30	70	100
	20231295		Constitution of India							
	20231295a		Pedagogy Studies							
	20231295b		Personality Development Through Life Enlightenment Skills							
Total				**16**	**0**	**8**	**18**	**310**	**490**	**800**



III SEMESTER

S.No	Course Code	Category	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total
1	20231361A	PE	**Program Elective – 5** Quality Engineering in Manufacturing	3	0	0	3	30	70	100
	20231361B		Green Manufacturing							
	20231361C		MOOCS-1 (NPTEL/ SWAYAM) 12 Week program related to the programme which is not listed in the course structure.							
2	20231361e	OE	MOOCS-2(NPTEL/ SWAYAM) Any12 Week Course on Engineering/Management/ Mathematics offered by other than parent department.	3	0	0	3	30	70	100
			Open Elective							
	20231362a		Composite Materials, Cost Management of Engineering Projects							
	20231362b		Energy Management							
	20231362c		Internet of Things and Applications							
	20231362d		Cyber Security							
3	20231341	PJ	**Dissertation-I/ Industrial Project**	0	0	20	10	-	-	-
			Total	**6**	**0**	**20**	**16**	**60**	**140**	**200**

University Nominee (Dr. B. Balakrishna) | Subject Expert (Dr. D. Ravi Kumar) | Industrial Expert (Mr. Rajiv Aramadaka) | Internal Member (Dr. P.M.M.S. Sarma) | Special Invitee Member (Dr.M.V.Sekhar Babu)

Internal Member (Dr. T. Jayananda Kumar) | Internal Member (Dr. D. Santha Rao) | Internal Member (Mr. Kedaranath M) | Internal Member (Mr. B.Joga Rao) | Internal Member (Mrs.E. Nirmala Devi)

Internal Member (Mr.M. Balakrishna) | Internal Member (Mr. P.Veera Raju) | Internal Member (Mr. D. Suman) | Internal Member (Mr. G Ramakrishna) | Chairman, BoS (Dr. M. Sreenivasa Rao)

IV Semester

S. No	Course Code	Category	Course Name	L	T	P	Credits	Internal Marks	External Marks	Total
1	20231441	PJ	Dissertation -II	0	0	32	16	-	-	-
			Total	**0**	**0**	**32**	**16**	-	-	-

University Nominee (Dr. B. Balakrishna) | Subject Expert (Dr. D. Ravi Kumar) | Industrial Expert (Mr. Rajiv Aramadaka) | Internal Member (Dr. P.M.M.S. Sarma) | Special Invitee Member (Dr.M.V.Sekhar Babu)

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Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Geometric Modeling**				
Teaching	Total contact hours- 62	L	T	P	C
Prerequisite(s): CAD/CAM		3	0	0	3

Course Objectives:

- To understand the need and different applications of geometric modeling techniques.
- To learn about different techniques involved in creating curves and surfaces.
- To learn the concepts of solid modeling.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Describe the concepts and functions involved in Cubic Spline curves.
CO2:	Discuss the properties and characteristics of Bezier curves.
CO3:	Analyze the derivatives for B-Spline Curves.
CO4:	Categorize various surfaces used in Geometric modeling.
CO5:	Explain different types of solids and their modeling concepts.

Syllabus

UNIT - I

CUBIC SPLINES –I: Definition, Explicit and implicit equations, parametric equations, Algebraic and geometric form of cubic spline, Hermite cubic spline, tangent vectors, parametric space of a curve, blending functions.

UNIT - II

CUBIC SPLINES-II: Four point form, reparametrization, truncating and subdividing of curves. Graphic construction and interpretation, composite pc curves.

BEZIER CURVES: Bezier Basis Functions, Control points, Truncating and subdividing, Composite Bezier curves, Rational Bezier Curves, Equations of Bezier curves, Properties, Derivatives.

UNIT - III

B-SPLINE CURVES: Introduction, knot vectors, properties, and derivatives;B-Spline basis functions – Non-uniform, Uniform, Quadratic and Cubic B-Spline; Closed B-Spline, Continuity, Conversion between Basis functions, Nonuniform Rational B-Spline Curves, Representing Conics with NURBS Curves, Cubic Beta Splines.

UNIT –IV

SURFACES: Bicubic surfaces, Coon's surfaces, Bezier surfaces, B-Spline surfaces, surfaces of revolutions, Sweep surfaces, ruled surfaces, tabulated cylinder, bilinear surfaces, Gaussian curvature.

UNIT – V

SOLIDS: Tricubic solid, Algebraic and geometric form.

SOLID MODELING CONCEPTS: Wire frames, Boundary representation, Half space modeling, spatial

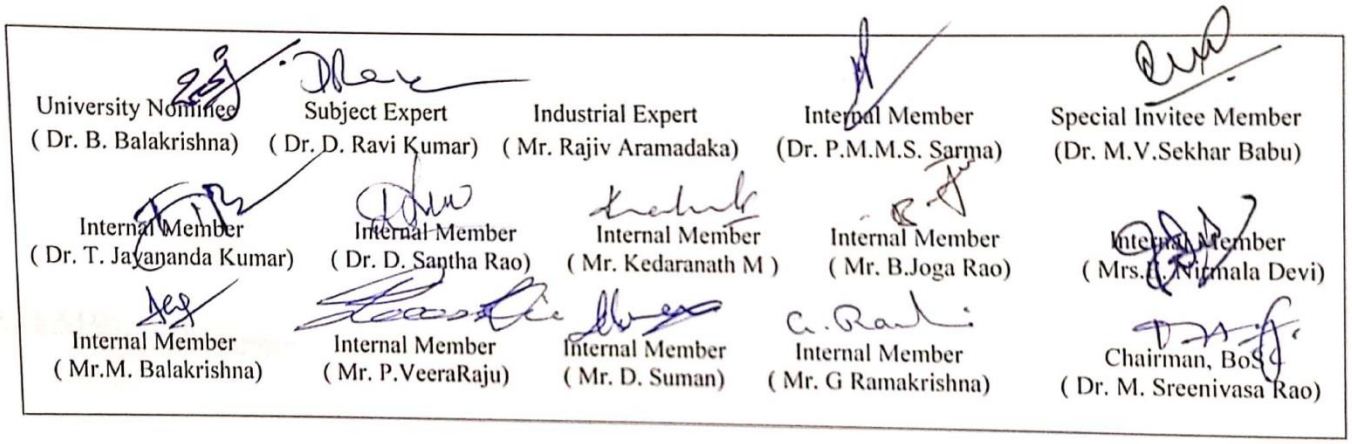
cell, cell decomposition, classification problem.

Text Books:

1. Elements of Computer Graphics by Roger & Adams Tata McGrawHill.
2. Geometric Modeling by Micheal E. Mortenson, McGraw Hill Publishers.

References:

1. Computer Aided Design and Manufacturing, K.Lalit Narayan, K.Mallikarjuna Rao, MMM Sarcar, PHI Publishers.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Computer Aided Manufacturing**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): CAD/CAM		3	0	0	3

Course Objectives:

- To impart the knowledge on technological developments in computer aided programming.
- To learn the CNC tooling systems.
- To understand the concept of post processors and micro controllers.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Illustrate various part programming techniques.
CO2:	Discuss the tooling systems for CNC machines.
CO3:	Describe the concept of post processors for CNC.
CO4:	Explain the functions and applications of micro controllers and PLC's.
CO5:	Explain the various concepts of CAPP systems.

Syllabus

UNIT - I

COMPUTER AIDED PROGRAMMING: General information, APT programming, examples Apt programming problems (2D machining only). NC programming on CAD/CAM systems, the design and implementation of post processors .Introduction to CAD/CAM software, Automatic Tool Path generation.

UNIT - II

TOOLING FOR CNC MACHINES: Interchangeable tooling system, preset and qualified toois, coolant fed tooling system, modular fixturing, quick change tooling system, automatic head changers. DNC Systems and Adaptive Control: Introduction, type of DNC systems, advantages arid disadvantages of DNC, adaptive control with optimization, Adaptive control with constrains, Adaptive control of machining processes like turning, grinding.

UNIT - III

POST PROCESSORS FOR CNC: Introduction to Post Processors: The necessity of a Post Processor, the general structure of a Post Processor, the functions of a Post Processor, DAPP — based- Post Processor: Communication channels and major variables in the DAPP — based Post Processor, th creation of a DAPP — Based Post Processor.

UNIT - IV

MICRO CONTROLLERS: Introduction, Hardware components, I/O pins, ports, external memory:, counters, timers and serial data I/O interrupts. Selection of Micro Controllers Embedded Controllers, Applications and Programming of Micro Controllers. Programmable Logic Controllers (PLC' s): Introduction, Hardware components of PLC, System, basic structure, principle of operations,

Programming mnemonics timers, Internal relays and counters, Applications of PLC's in CNC Machines.

UNIT - V

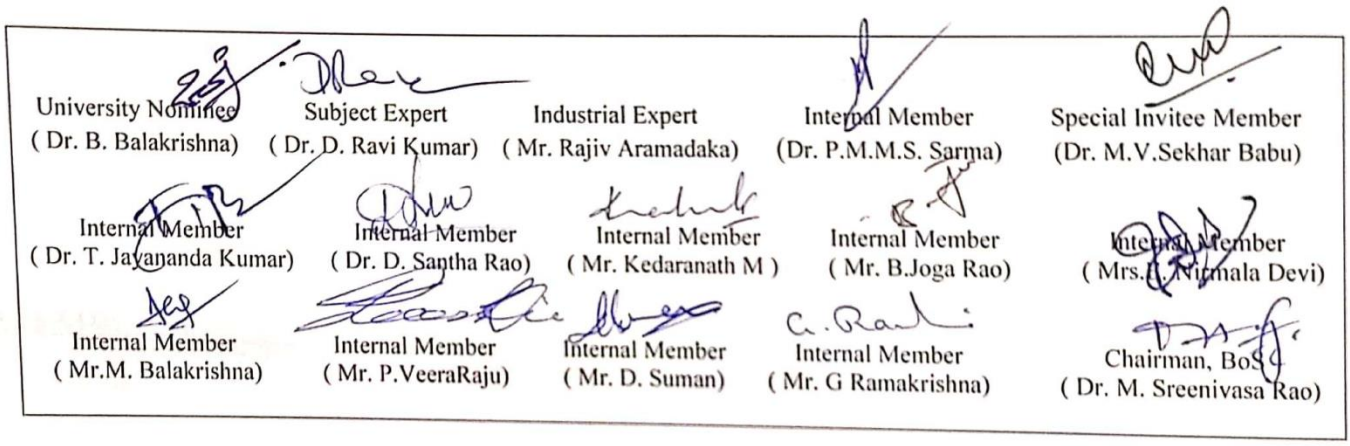
COMPUTER AIDED PROCESS PLANNING: Hybrid CAAP System, Computer Aided Inspection and quality control, Coordinate Measuring Machine, Limitations of CMM, Computer Aided Testing, Optical Inspection Methods, Artificial Intelligence and expert system: Artificial Neural Networks, Artificial Intelligence in CAD, Experts systems and its structures.

Text Books:

1. Computer Control of Manufacturing Systems / YoramKoren / McGraw Hill.1983.
2. CAD/CAM Principles and Applications, P.N.Rao,TMH.

References:

1. Computer Aided Design Manufacturing – K. Lalit Narayan, K. Mallikarjuna Rao and M.M.M. Sarcar, PHI, 2008.
2. CAD / CAM Theory and Practice,/IbrahimZeid,TMH.
3. CAD / CAM / CIM, Radhakrishnan and Subramanian, NewAge.
4. Principles of Computer Aided Design and Manufacturing, FaridAmirouche,Pearson.
5. Computer Numerical Control Concepts and programming, Warren S Seames,Thomson.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Computational Methods in Engineering (Elective I)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Engineering Mathematics, Operations Research		3	0	0	3

Course Objectives:

- Review the fundamental concepts of engineering mathematics.
- Learn the mathematical modeling of mechanical systems.
- Apply analytical and numerical techniques to analyze mechanical systems.
- To learn different methods to solve the partial differential equations.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Use various Numerical Methods to solve Engineering problems.
CO2:	Solve boundary and Characteristic Problems through set of equations.
CO3:	Explain transformation techniques like Laplace, Discrete and Fast Fourier transforms.
CO4:	Identify various methods to derive Numerical solutions of Partial Differential Equations.
CO5:	Describe the procedure to solve characteristic wave equations.

Syllabus

UNIT – I

INTRODUCTION TO NUMERICAL METHODS APPLIED TO ENGINEERING PROBLEMS: Examples, solving sets of equations – Matrix notation – Determinants and inversion – Iterative methods – Relaxation methods – System of non-linear equations. Least square approximation fitting of non-linear curves by least squares –regression analysis- multiple linear regression, non linear regression - computer programs.

UNIT – II

BOUNDRY VALUE PROBLEMS AND CHARECTERISTIC VALUE PROBLEMS: Shooting method – Solution through a set of equations – Derivative boundary conditions – Rayleigh – Ritz method – Characteristic value problems.

UNIT – III

TRANSFORMATION TECHNIQUES: Continuous fourier series, frequency and time domains, laplace transform, fourier integral and transform, discrete fourier transform (DFT), Fast fourier transform(FFT).

UNIT – IV

NUMERICAL SOLUTIONS OF PARTIAL DIFFERENTIAL EQUATIONS: Laplace's equations – Representations as a difference equation – Iterative methods for Laplace's equations – poisson equation – Examples – Derivative boundary conditions – Irregular and non – rectangular grids – Matrix patterns, sparseness – ADI method – Finite element method.

UNIT – V

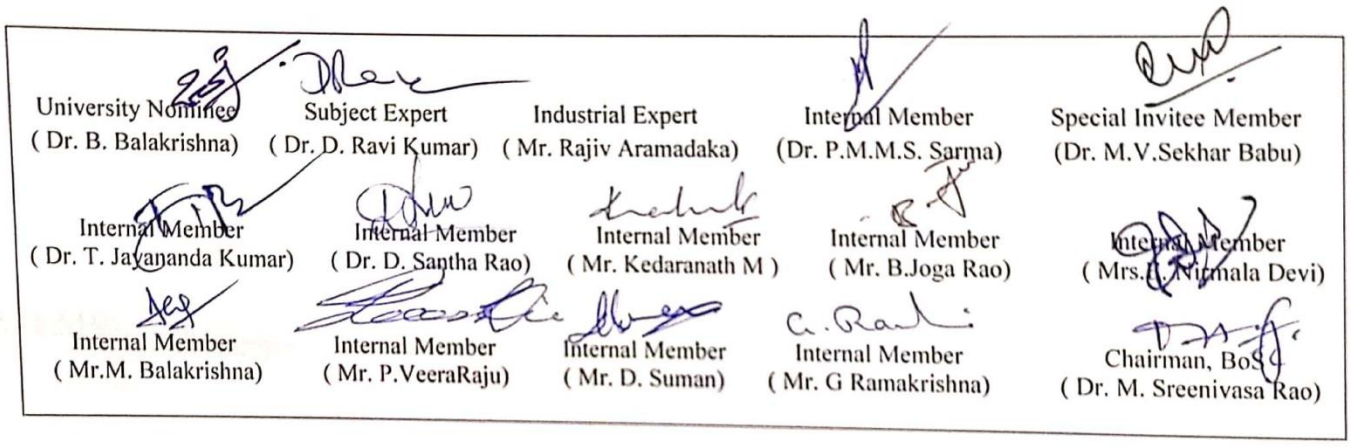
PARTIAL DIFFERENTIAL EQUATIONS: Explicit method – Crank-Nickelson method – Derivative boundary condition – Stability and convergence criteria. Solving wave equation by finite differences-stability of numerical method –method of characteristics-wave equation in two space dimensions-computer programs.

Text Books:

1. Numerical Methods for Engineers, Steven C.Chapra,Raymond P.Canale, TataMc-Graw Hill.
2. Applied numerical analysis‖ Addison-Wesley, Curtis F.Gerald, Partick.O.Wheatly, 19893.
3. Numerical methods, Douglas J.Faires,Riched Burden‖ Brooks/Cole publishing company,1998.Second edition.

References:

1. Numerical mathematics and computing, Ward Cheney and David Kincaid—Brooks/Cole publishing company1999, Fourth edition.
2. Mathematical methods for physics and engineering, Riley K.F,.M.P.Hobson and Bence S.J, Cambridge Universitypress,1999.
3. Advanced Mathematics, Kreysis.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Composite Materials (Elective I)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Metallurgy and Material Science, Strength of Materials.		3	0	0	3

Course Objectives:

- To know the behavior of constituents in the composite materials.
- To understand the different types of matrices.
- To develop the student's skills in understanding the different manufacturing methods available for composite materials.
- To understand the various characterization techniques.
- To understand the basic laws in mechanics of composite materials.

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Use different types of manufacturing processes in the preparation of composite materials.
CO2:	Explain about the polymer and metal matrix composites.
CO3:	Discuss about the ceramic matrix composites and carbon fiber/carbon matrix composites.
CO4:	Assess the performance of composites.
CO5:	Explain the micro and macro mechanical behavior of composites.

Syllabus

UNIT-I

INTRODUCTION TO COMPOSITE MATERIALS: Definition, classification & brief history of composite materials.

CONSTITUENT OF COMPOSITE MATERIALS: Reinforcements, Matrix, Coupling agents, coatings & fillers.

REINFORCEMENTS: Introduction, Glass Fibers, Boron Fibers, Carbon Fibers, Organic Fibers, Ceramic Fibers, Whiskers, Other Non-oxide Reinforcements, Comparison of Fibers

MATRIX MATERIALS: Polymers, Metals and Ceramic Matrix Materials.

INTERFACES: Wettability, Crystallographic nature of interface, types of bonding at the interface and optimum interfacial bond strength.

UNIT-II

POLYMER MATRIX COMPOSITES (PMC): Processing of Thermosetting Matrix Composites, Thermoplastic Matrix Composites, carbon reinforced polymer composites. Interfaces in PMC's, Structure & Properties of PMC's, applications.

METAL MATRIX COMPOSITES: Types of metal matrix composites, Important Metallic Matrices, Processing, Interfaces in Metal Matrix Composites, Properties &Applications.

UNIT-III

CERAMIC MATRIX COMPOSITES (CMC): Cold Pressing & Sintering, Hot Pressing, Reaction Bonding Processes, Infiltration, Directed Oxidation, In Situ Chemical Reaction Technique, Sol-Gel, Polymer Infiltration & Pyrolysis, Electrophoretic Deposition, Self-Propagating High Temperature Synthesis. Interfaces, properties and applications of CMC's.

CARBON FIBER/CARBON MATRIX COMPOSITES: Processing of Carbon/Carbon Composites, Oxidation protection of Carbon/Carbon Composites, Properties of Carbon/Carbon Composites, and application of Carbon/Carbon Composites.

UNIT-IV

NON-CONVENTIONAL COMPOSITES: Introduction, Nanocomposites, Polymer clay nanocomposites, self healing composites, self-reinforced composites. Biocomposites, Hybrid Composites.

PERFORMANCE/CHARACTERIZATION OF COMPOSITES: Static Mechanical Properties; Tensile Properties, Compressive Properties, Flexural Properties, In-Plane Shear Properties, Interlaminar Shear Strength. Tension–Tension Fatigue, Flexural Fatigue, Charpy & Izod and Drop-Weight Impact Test.

UNIT-V

MICROMECHANICS OF COMPOSITES: Density, Mechanical Properties**;** Prediction of Elastic Constants, Micromechanical Approaches, Halpin-Tsai Equations, Transverse Stresses, Thermal properties. Numerical Problems.

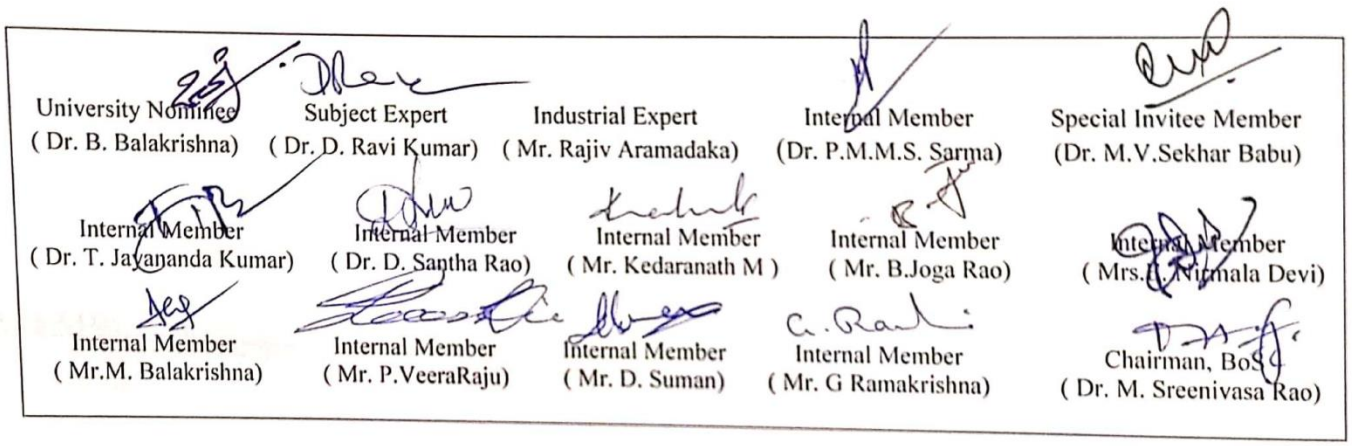
MACRO MECHANICS OF COMPOSITES: Introduction, Elastic constants of an isotropic material, elastic constants of a lamina, relationship between engineering constants and reduced stiffness's and compliances

Text Books:

1. Engineering Mechanics of Composite Materials / Isaac and M Daniel/Oxford University Press.
2. Mechanics of Composite Materials - Second Edition (Mechanical Engineering) /AutarK.Kaw / CRC Press.

References:

1. Mechanics of Composite Materials / R. M. Jones/ McGraw Hill Company, New York, 1975.
2. Analysis of Laminated Composite Structures / L. R. Calcote/Van NostrandRainfold,NY 1969.
3. Analysis and performance of fibre Composites /B. D. Agarwal and L. J. Broutman /Wiley-Interscience, New York, 1980.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Industrial Robotics (Elective I)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s):Kinematics of Machinery, Instrumentation and Control Systems.		3	0	0	3

Course Objectives:

- To understand basic components and their functions of a Robot.
- To learn various types of end effectors and sensors, and their applications.
- To understand the concepts of robot kinematics.
- To learn different robot programming languages.
- To learn robot safety issues and economics.

Course Outcomes:

On completion of the course, the students will be able to-	
CO1:	Discuss components of different robots and their coordinate systems used in industries.
CO2:	Use the concepts of robot kinematics to analyze the arm movement.
CO3:	Discuss the types of sensors and end effectors for various robot configurations.
CO4:	Identify suitable programming languages and commands for different robot applications.
CO5:	Explain the robot cell design and their applications.

Syllabus

UNIT- I

INTRODUCTION: Automation and Robotics, robot anatomy, robot configuration, motions joint notation scheme, work volume, robot drive systems, control systems and dynamic performance, precision of movement.

CONTROL SYSTEM AND COMPONENTS: Basic concepts and motion controllers, control system analysis, robot actuation and feedback components, positions sensors, velocity sensors, actuators, power transmission systems, robot joint control design.

UNIT- II

MOTION ANALYSIS AND CONTROL: Manipulator kinematics, position representation, forward and inverse transformations, homogeneous transformations, manipulator path control, robot arm dynamics, configuration of a robot controller.

UNIT- III

END EFFECTORS: Grippers-types, operation, mechanism, force analysis, tools as end effectors consideration in gripper selection and design. Sensors: Desirable features, tactile, proximity and range sensors, uses of sensors inrobotics.

MACHINE VISION: Functions, sensing and digitizing-imaging devices, lighting techniques, analog to digital single conversion, image storage: Image processing and analysis-image data reduction, segmentation, feature extraction, object recognition. training the vision system, robotic application.

UNIT- IV

ROBOT PROGRAMMING: Lead through programming, robot program as a path in space, motion

interpolation, WAIT, SIGNAL and DELAY commands, Branching, capabilities and limitations of lead through methods.

ROBOT LANGUAGES: Textual robot Languages, generations of robot programming languages, robot language structures, elements and function.

UNIT- V

ROBOT CELL DESGIN AND CONTROL: Robot cell layouts-Robot centered cell, In-line robot cell, considerations in work design, work and control, Inter locks, error detection, work cell controller.

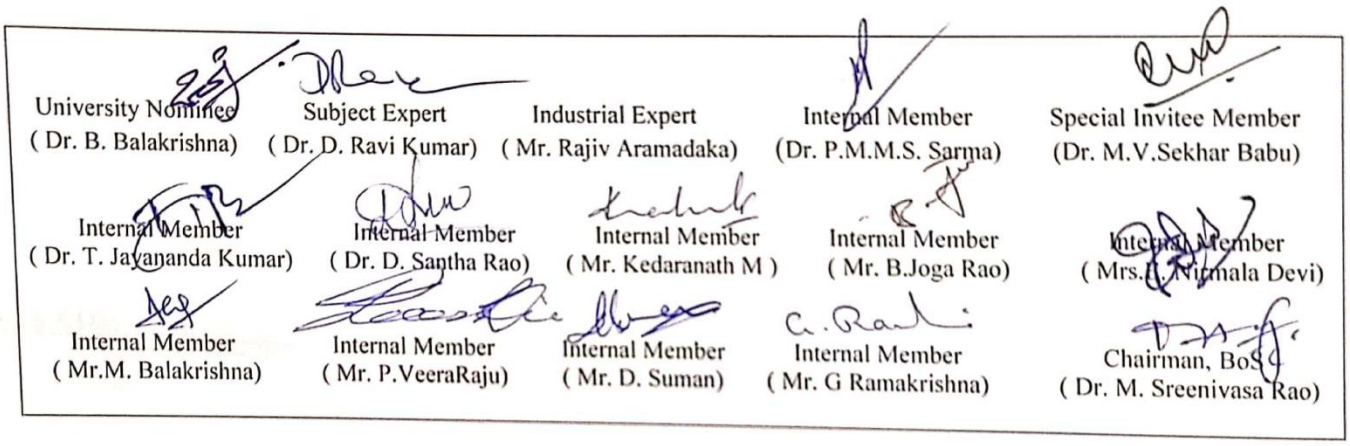
ROBOT APPLICATION: Material transfer, machine loading/unloading, processing operation, assembly and inspection, future Application.

Text Books:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Introduction to Robotic Mechanics and Control by JJ Craig, Pearson, 3rdedition.

References:

1. Robotics / Fu K S/ McGrawHill.
2. Robotic Engineering / Richard D. Klafter, PrenticeHall.
3. Robot Analysis and Intelligence / Asada and Slotine / WileyInter-Science.
4. Robot Dynamics & Control – Mark W. Spong and M. Vidyasagar / JohnWiley.
5. Introduction to Robotics by SK Saha, TheMcGrah Hill Company, 6th,2012.
6. Robotics and Control / Mittal R K &Nagrath I J /TMH.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Mechatronics (Elective II)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Basic Electrical and Electronic Engineering.		3	0	0	3

Course Objectives:

- To impart knowledge about the elements and techniques involved in mechatronics systems.
- To learn the concepts of actuators and their uses.
- To understand the applications of microprocessors and microcontrollers in mechanical systems.
- To understand the concept of PLC system and its programming, and its significance.
- To learn architecture and system interface of analog and digital convertors.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the key elements of mechatronic system.
CO2:	Describe the various types of solid state devices like PN junction diode, BJT, FET and signal conditioning.
CO3:	Outline various sensors and actuators for an engineering application.
CO4:	Construct PLC program and implementation of real life systems.
CO5:	Use appropriate microprocessor and microcontroller for interfacing sensors, actuators and other mechatronic elements.

Syllabus

UNIT-I

Mechatronics systems, elements, levels of mechatronics system, mechatronics design process, system, measurement systems, control systems, microprocessor-based controllers, advantages and disadvantages of mechatronics systems. Sensors and transducers, types, displacement, position, proximity, velocity, motion, force, acceleration, torque, fluid pressure, liquid flow, liquid level, temperature and lightsensors.

UNIT-II

Solid state electronic devices, PN junction diode, BJT, FET, DIAC and TRIAC.analog signal conditioning, amplifiers, filtering.Introduction to MEMS & typical applications.

UNIT-III

Hydraulic and pneumatic actuating systems, fluid systems, hydraulic and pneumatic systems, components, control valves, electro-pneumatic, hydro-pneumatic, electro-hydraulic servo systems.
Mechanical actuating systems and electrical actuating systems.

UNIT-IV

Digital electronics and systems, digital logic control, microprocessors and microcontrollers, programming, process controllers, programmable logic controllers, PLCs versus computers, application of PLCs for control.

UNIT-V

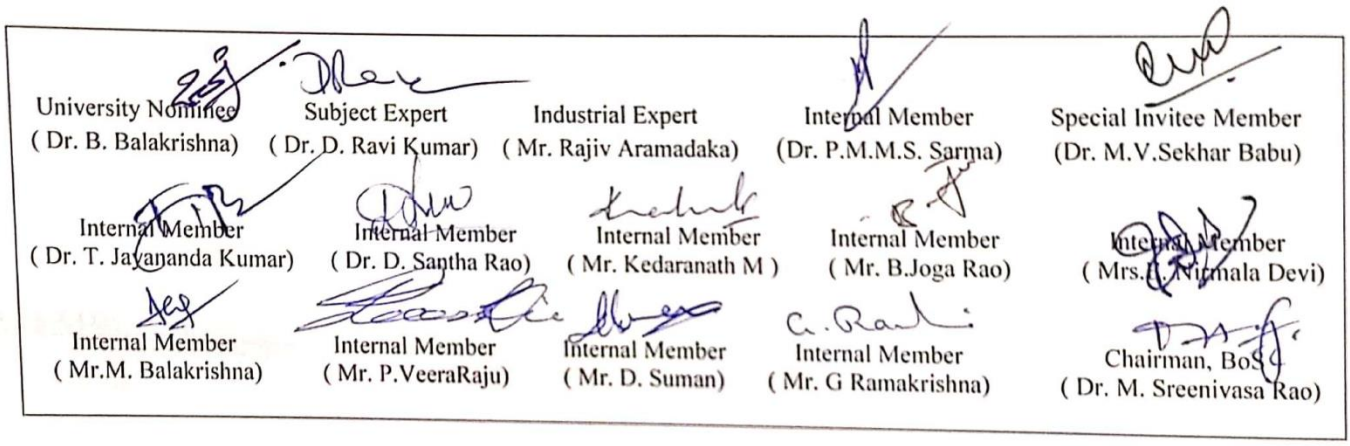
System and interfacing and data acquisition, DAQS , SCADA, A to D and D to A conversions; Dynamic models and analogies, System response. Design of mechatronics systems & future trends.

Text Books:

1. MECHATRONICS Integrated Mechanical Electronics Systems/KP Ramachandran& GK VijayaRaghavan/WILEY India Edition/2008.
2. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering byW Bolton, Pearson Education Press, 3rd edition,2005.

References:

1. Mechatronics Source Book by Newton C Braga, Thomson Publications,Chennai.
2. Mechatronics – N. Shanmugam / Anuradha Agencies Publishers.
3. Mechatronics System Design / Devdasshetty/Richard/Thomson.
4. Mechatronics/M.D.Singh/J.G.Joshi/PHI.
5. Mechatronics – Electronic Control Systems in Mechanical and Electrical Engg. 4th Edition,
6. Pearson, 2012 W.Bolton.
7. Mechatronics – Principles and Application Godfrey C. Onwubolu, Wlsevier, 2006 Indian print.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Mechanical Vibrations (Elective II)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Metallurgy and Material Science, Instrumentation and Control Systems		3	0	0	3

Course Objectives:

- To study about damped and un-damped vibrations under single degree of freedom.
- To gain basic knowledge on non periodic excitations.
- To understand the numerical methods for solving vibrations of mechanical systems.
- To study the multi degrees of freedom and torsional vibrations.

Course Outcomes:

On Completion of the course, the students shall be able to-	
CO1:	Explain the damped and un-damped vibration systems with single degree of freedom.
CO2:	Analyze the response of machine components in forced vibration with periodic excitations.
CO3:	Describe the damped and un-damped vibration systems with multi degree of freedom.
CO4:	Solve the vibrational problems using numerical approach.
CO5:	Analyze the torsional vibrations of multi degree of freedom and its measurement.

Syllabus

UNIT-I

SINGLE DEGREE OF FREEDOM SYSTEMS: Undamped and damped free vibrations: forced vibrations ; coulomb damping; Response to harmonic excitation; rotating unbalance and support excitation, vibration isolation and transmissibility, vibrometers, velocity meters & accelerometers.

UNIT-II

RESPONSE TO NON PERIODIC EXCITATIONS: Unit Impulse, unit step and unit Ramp functions; Response to arbitrary excitations, the Convolution Integral; shock spectrum; System response by the Laplace Transformation method.

UNIT-III

MULTI DEGREE FREEDOM SYSTEMS: Principal modes – Undamped and damped free and forced vibrations ; undamped vibration absorbers, Matrix formulation, stiffness and flexibility influence coefficients; Eigen value problem; normal modes and their properties; Free and forced vibration by Modal analysis; Method of matrix inversion; Torsional vibrations of multi – Rotor systems and geared systems; Discrete-Time systems.

UNIT-IV

NUMERICAL METHODS: Rayliegh's, Stodola's, Matrix iteration, Rayleigh-Ritz Method and Holzer's methods

UNIT-V

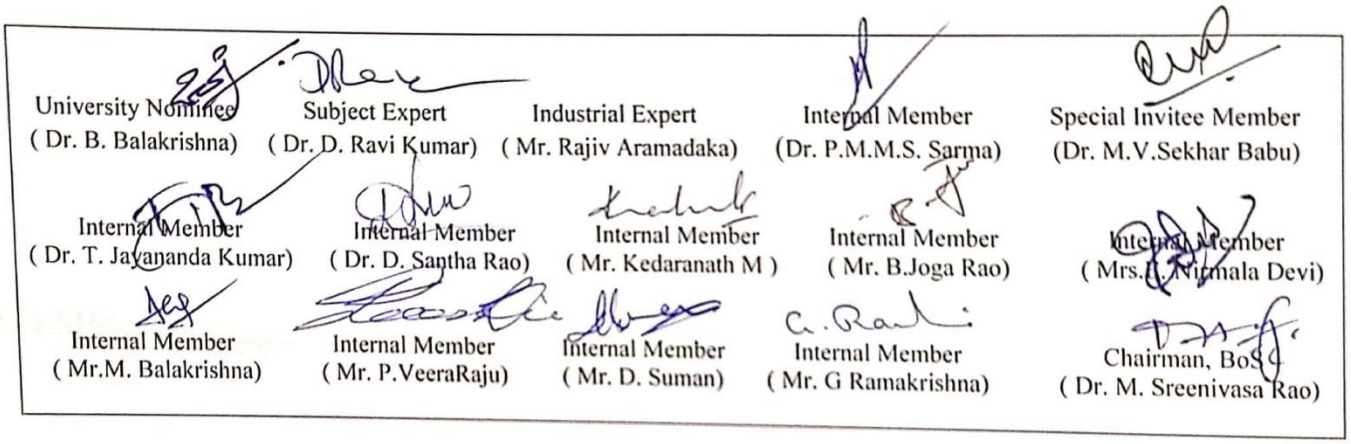
APPLICATION OF CONCEPTS: Free vibration of strings – Longitudinal oscillations of bars- transverse vibrations of beams- Torsional vibrations of shafts. Critical speeds without and with damping, secondary critical speed.

Text books:

1.Elements of Vibration Analysis by Meirovitch.
2.Mechanical Vibrations by G.K. Groover.

References:

1. Vibrations by W.T.Thomson
2. Mechanical Vibrations – Schaumseries.
3. Vibration problems in Engineering by S.P.Timoshenko.
4. Mechanical Viabrations – V.Ram Murthy.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Product Design and Development (Elective-II)**				
Teaching	Total contact hours- 48	L	T	P	C
Prerequisite(s): Design for Manufacturing		3	0	0	3

Course Objectives:

- To learn the product life cycle and product development process.
- To learn the basics of design of experiments.
- To understand the procedure of design for manufacturing and assembly.
- To learn the ergonomic and aesthetic needs for industrial design and elements of product development economics.

Course Outcomes:

On Completion of the course, the students will be able-	
CO1:	Describe the product development process and creativity techniques of design.
CO2:	Explain the various concepts of conceptual, industrial design and DOE techniques to select values of design variables.
CO3:	Recommend designs to reduce environmental impacts, manufacturing and assembly costs.
CO4:	Discuss the elements of economic analysis, assessment of ergonomic and aesthetic needs for industrial design.
CO5:	Explain the elements of concurrent engineering and role of intellectual property in product development.

Syllabus

UNIT-I

INTRODUCTION: Classification/Specifications of products, product life cycle, product mix - Introduction to product design: modern product development process, innovative thinking.

UNIT- II

MORPHOLOGY OF DESIGN: Conceptual design**:** generation, selection and embodiment of concept - product architecture - Industrial design: process, need - Robust design: Taguchi designs and design of experiments, design optimization.

UNIT-III

DESIGN FOR MANUFACTURING & ASSEMBLY: Methods of designing for manufacturing and assembly - Designs for Maintainability - Designs for Environment - Product costing - Legal factors and social issues, engineering ethics and issues of society related to design of products - Value Engineering / Value Analysis.: definition, methodology, case studies.

UNIT-IV

ECONOMIC ANALYSIS: Qualitative &quantitative –Ergonomics and Aesthetics: gross human autonomy, anthropometry, man-machine interaction, concepts of size and texture, colour, comfort criteria, psychological and physiological considerations.

UNIT-V

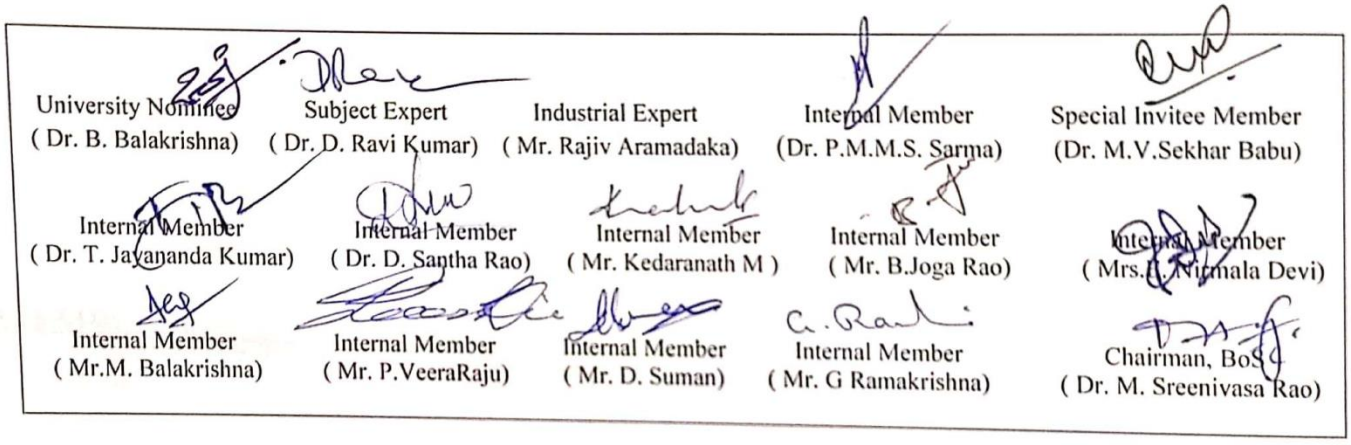
CREATIVITY TECHNIQUES: Creative thinking, conceptualization, brain storming, primary design, drawing, simulation, detail design - Concurrent Engineering: rapid prototyping, tools for product design, drafting/ modeling software, CAM interface - Patents & IP Acts: overview, disclosure preparation.

Text Books:

1. Product Design and Development, KarlTUlrich,Steven D Eppinger, 5th edition, Tata McGraw-hill,
2. The Mechanical Design Process, David G Ullman, 4th edition, McGraw-hill.
3. Product Design: Fundamentals and Methods,N F MRoozenberg, JEekels,1st Edition, Wiley Blackwell.
4. Product Design - Techniques in Reverse Engineering and New Product Development, Kevin Otto, Kristin Wood, 1st edition, Pearson Education.
5. Product Design for Manufacture and Assembly, Geoffrey Boothroyd, Peter Dewhurst, Winston A. Knight, CRC Press.

References:

1. Techniques of Value Analysis and Engineering, Lawrence D Miles, 3rd edition, Lawrence D miles Value Foundation.
2. Successful Product Design: What to Do and When, Hollins B, Pugh S, 1st edition, Butterworth – Heinemann Ltd.
3. Designing for Production, Edward N Baldwin, Benjamin W Niebel, 1st edition, Literary Licensing.
4. Design Methods, John C Jones, 2nd edition, Wiley.
5. Design for Manufacturability Handbook, James G Bralla, 2nd edition, McGraw-Hill Education.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1 semester)			
Course Code	**Research Methodology**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s):		2	0	0	2

Course Objectives:

- To learn objectives and types of research.
- To learn the identification of problem based on literature review.
- To understand the methods of research.
- To learn to analyze the data collection.
- To learn the thesis writing.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	List out the objectives and types of research.
CO2:	Discuss the research formulation and literature review.
CO3:	Explain the methods of research.
CO4:	Assess the data collection and its analysis.
CO5:	Complete the thesis writing of research.

Syllabus

UNIT-I
Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT-II
Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how towrite report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT-III
Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT-IV
Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT-V

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs.

REFERENCES:

1. Stuart Melville and Wayne Goddard, ―Research methodology: An introduction for science& Engineering students.
2. Wayne Goddard and Stuart Melville,―Research Methodology: An Introduction.
3. RanjitKumar,2nd Edition,―Research Methodology: A Step by Step Guide for beginners.
4. Halbert, ―Resisting Intellectual Property‖, Taylor & FrancisLtd,2007.
5. Mayall, ―Industrial Design‖, McGraw Hill,1992.

Text Books:

1. Research Methodology – Methods and Techniques, C.R.Kothari, , New Age International Publishers, 2004.
2. Research Methods,William M. Trochim, James P. Donnelly, , 2/e, Cengage India, 2016.

University Nominee (Dr. B. Balakrishna)	Subject Expert (Dr. D. Ravi Kumar)	Industrial Expert (Mr. Rajiv Aramadaka)	Internal Member (Dr. P.M.M.S. Sarma)	Special Invitee Member (Dr.M.V.Sekhar Babu)
Internal Member (Dr. T. Jayananda Kumar)	Internal Member (Dr. D. Santha Rao)	Internal Member (Mr. Kedaranath M)	Internal Member (Mr. B.Joga Rao)	Internal Member (Mrs.E. Nirmala Devi)
Internal Member (Mr.M. Balakrishna)	Internal Member (Mr. P.Veera Raju)	Internal Member (Mr. D. Suman)	Internal Member (Mr. G Ramakrishna)	Chairman, BoS (Dr. M. Sreenivasa Rao)

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Advanced CAD Lab**				
Teaching	Total contact hours- 52	L	T	P	C
Prerequisite(s): Computer Aided Design , Finite Element Methods		0	0	4	2

Course Objectives:

- To learn the modeling and numerical solving skills for truss structure problems.
- To familiarize Finite Element Analysis steps for solving beam problem.
- To understand the stress distribution on 2D plane surfaces.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Solve problems related to truss structure.
CO2:	Examine stress distribution on axi-symmetric geometries.
CO3:	Solve beam problems for different support conditions.
CO4:	Analyze uniaxial and biaxial plane stress and strain on rectangular plate.
CO5:	Identify stress distribution on corner bracket.

Students shall carry out the modeling and FE analysis of the following to predict deflection and stress distributions:

List of Experiments:

1. Static and Dynamic analysis of 2D truss structure.
2. Static and Dynamic analysis of 3D truss structure.
3. Stress analysis of Axi-symmetric components.
4. Stress analysis of Cantilever with point load.
5. Stress analysis of simply supported beam with uniform load.
6. Stress analysis of simply supported beam with uniformly varying load.
7. Uniaxial plane stress condition on rectangular plate.
8. Biaxial plane stress condition on rectangular plate.
9. Uniaxial plane strain condition on rectangular plate.
10. Biaxial plane strain condition on rectangular plate.
11. Static and Dynamic analysis of corner bracket.
12. Modal Analysis of 2D and 3D Beam
13. Stress Analysis of 3D Shell

14. Contact Analysis of sphere on flat surfaces
15. Structural analysis of thermocouple

University Nominee (Dr. B. Balakrishna)	Subject Expert (Dr. D. Ravi Kumar)	Industrial Expert (Mr. Rajiv Aramadaka)	Internal Member (Dr. P.M.M.S. Sarma)	Special Invitee Member (Dr. M.V.Sekhar Babu)
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Internal Member (Mr.M. Balakrishna)	Internal Member (Mr. P.VeeraRaju)	Internal Member (Mr. D. Suman)	Internal Member (Mr. G Ramakrishna)	Chairman, BoS (Dr. M. Sreenivasa Rao)

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. I Sem (1st semester)			
Course Code	**Manufacturing Lab**				
Teaching	Total contact hours- 50	L	T	P	C
Prerequisite(s): Material Science, Workshop Technology, Production Technology.		0	0	4	2

Course Objectives:

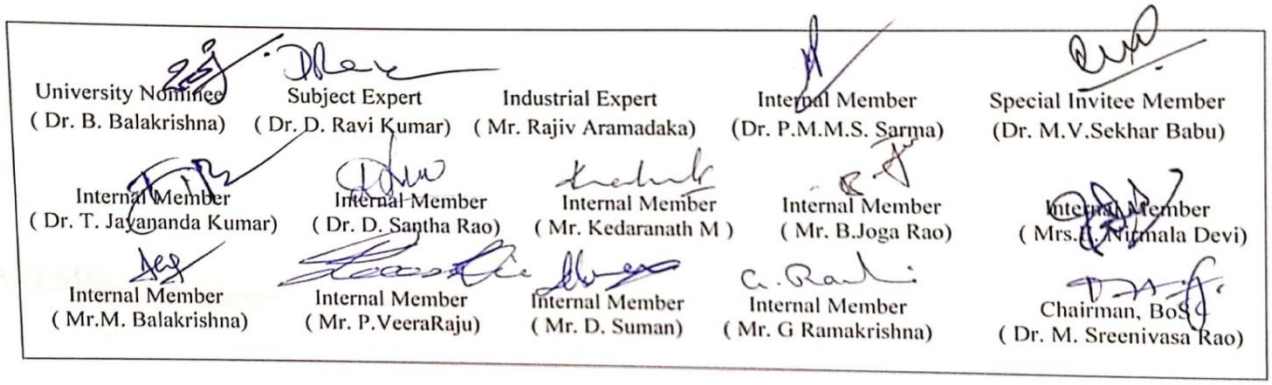
- To impart hands-on practical exposure on manufacturing processes such as welding, forging, casting, extrusion and sheet metal.
- To understand terminology and geometry of tools and various operations on lathe, milling, etc.
- To learn powder metallurgy concepts.
- To understand additive manufacturing methods.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Understand construction of cooling curves of metals and alloys.
CO2:	Gain knowledge on forging and forming methods.
CO3:	Gain the knowledge on joining of metals using welding process.
CO4:	Understand the process of producing components using powder metallurgy and additive manufacturing.
CO5:	Estimation of chip thickness, shear angle and cutting forces in machining.

List of Experiments:

1. Determine and Plot the cooling curve for pure metal and alloy of a given material.
2. Produce the solid billet using extrusion process.
3. Blanking, piercing and progressive die operations on sheet metal.
4. Mechanical properties of weldments.
5. Heat effected zone and micro structural evaluation of weldments.
6. Fabrication of billets by powder metallurgy route.
7. Fabrication of basic shapes by 3D printing.
8. Measurement of chip thickness and shear plane angle in machining processes.
9. Estimation of tool life in turning process using Taylor's equation.
10. Measurement of cutting forces using tool dynamometer.



Audit Course -I

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech			
Course Code	ENGLISH FOR RESEARCH PAPER WRITING				
Teaching	Totalcontacthours–32	L	T	P	C
Prerequisite(s)	Learners should equip with good research writing and Academic writing skills	2	0	0	0

Course objectives:

This Course aims to

- Provide Academic writing skills needed for academic performance
- Demonstrate required writing skills to display needed research potency
- Encourage the learners to improve written communication as well as research paper writing
- Support understanding the reviewing techniques of a research paper
- Identify the required key skills for research paper writing

Course Outcomes

On Completion of the course, the students will be able to	
CO1:	Understand how to improve writing skills and level of readability and Learn about what to write in each section of research paper
CO2:	Understand the skills needed when writing a Title. Ensure the good quality of paper at very first- time submission
CO3:	Plan and organize the text and produce the data with proper relevancy
CO4:	Improve Academic writing skills, that benefit further performance
CO 5:	Learn different types of writing

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Units	CONTENTS
1	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness
2	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction
3	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.
4	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,
5	skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

Suggested Studies:

1. Goldbort R (2006) Writing for Science, Yale University Press (available on GoogleBooks)
2. Day R (2006) How to Write and Publish a Scientific Paper, Cambridge UniversityPress
3. Highman N (1998), Handbook of Writing for the Mathematical Sciences,SIAM. Highman'sbook.
4. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London,2011

CO-PO Mapping:
(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	2	2	-	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	1	3	-	-	-	-
CO4	-	-	-	-	-	-	2	2	-	-	-	2
CO5	-	-	-	-	-	-	2	2	-	-	-	1

INTERNAL MEMBERS OF BOS

1.Ms.S.Sunila Sailaja Asst.Prof -CHIARMAN-BOS

2. Ms B.L. Ratnavali Assoc.Prof | 3. Ms D.V.L. Shanthi Asst.Prof | 4. MsM.Kareesa Prabhu Priya Asst.Prof | 5. Mr.K. Ramaiah Asst.Prof | 6.Kiran Kumar Asst.Prof

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech			
Course Code	DISASTER MANAGEMENT				
Teaching	Total contact hours–48h	L	T	P	C
Prerequisite(s): To develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.		2	0	0	0

Course Objective:

Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response, critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives. And the critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Distinguish between Hazard and Disaster
CO2	To identify the loss of Human and Animal Life
CO3	To discuss about the Floods, Droughts, Cyclonic and Coastal Hazards
CO4	Evaluate the risk factor in disaster
CO5	Analyze the disaster risk reduction

Syllabus

UNIT –I
DISASTER

Introduction, Definition, Factors and Significance; Difference between Hazard and Disaster; Natural and Manmade Disasters: Difference,Nature, Types and Magnitude.

UNIT – II
REPERCUSSIONS OF DISASTERS AND HAZARDS

Economic Damage, Loss of Human and Animal Life, Destruction of Ecosystem.
Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts and Famines, Landslides and Avalanches, Man- made disaster: Nuclear Reactor Meltdown,Industrial Accidents, Oil Slicks and Spills, Outbreaks of Disease and Epidemics, War andConflicts.

UNIT – III
DISASTER PRONE AREAS IN INDIA

Study of Seismic Zones; Areas Prone to Floods and Droughts, Landslides and Avalanches; Areas Prone to Cyclonic and Coastal Hazards with Special Reference to Tsunami; Post-Disaster Diseases and Epidemics

UNIT – IV
DISASTER PREPAREDNESS AND MANAGEMENT
Preparedness: Monitoring of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological and Other Agencies, **Media Reports**:Governmental and Community Preparedness.

UNIT – V
RISK ASSESSMENT
Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co- Operation in Risk Assessment and Warning, People'sParticipation in Risk Assessment. Strategies for Survival.

Text Books:
1. R. Nishith, Singh AK, "Disaster Management in India: Perspectives, issues and strategies" New Royal book Company.

References:
1. Sahni, PardeepEt.Al. (Eds.), "Disaster Mitigation Experiences and Reflections", Prentice Hall of India, New Delhi.
2. Goel S. L., Disaster Administration and Management Text and Case Studies", Deep &Deep Publication Pvt. Ltd., New Delhi.

Weblink:
1. https://nptel.ac.in/courses/124/107/124107010/
2. https://nptel.ac.in/courses/105/104/105104183/

CO-PO Mapping:
(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	1	-	1	1	-	-	2	-	-	2
CO2	3	2	3	2	3	3	-	-	3	-	-	3
CO3	3	2	2	2	2	2	-	-	2	-	2	2
CO4	3	2	3	2	2	3	-	-	2	-	-	3
CO5	3	2	3	2	3	3	-	-	3	-	-	3

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Ms Ch Deepika
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Assistant Professor
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DEPARTMENT OF MECHANICAL ENGINEERING

M.Tech. (CAD/CAM) Course Structure & Syllabus: (2020 - 21)

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Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech			
Course Code	VALUE EDUCATION				
Teaching	Totalcontacthours–32	L	T	P	C
Prerequisite(s): Learners must be proficient in imbibing values and preserve self-efficacy		2	0	0	0

Course Objectives

This course aims to make the learner

- Understand value of education and self-development
- Imbibe good values
- Know about the importance of character

Course outcomes

On Completion of the course, the students will be able to	
CO1:	Gain Knowledge of self-development
CO2:	Learn the importance of Human values
CO3:	Develop the overall personality

Syllabus

Unit	Content
1	Values and self-development –Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non- moral valuation. Standards and principles. Value judgments
2	Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature ,Discipline
3	Personality and Behavior Development - Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking.
4	Free from anger, Dignity of labour. Universal brotherhood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature
5	Character and Competence –Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence Humility, Role of Women.

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Suggested reading:

Chakroborty, S.K. "Values and Ethics for organizations Theory and practice", Oxford University Press, New Delhi

CO-PO Mapping:
(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-': No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	3	2	-	-	-	-
CO2	-	-	-	-	-	-	3	3	-	-	-	1
CO3	-	-	-	-	-	-	3	3	-	-	-	-

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5. Mr.K. Ramaiah Asst.Prof
6.Kiran Kumar Asst.Prof

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2nd semester)			
Course Code	**Optimization & Reliability**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Mathematics-III		3	0	0	3

Course Objectives:

- To learn various optimization techniques.
- To understand differences and similarities between conventional and evolutionary algorithms.
- To understand importance of reliability and its applications.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Solve single and multi-variable optimization problems.
CO2:	Solve the engineering problems using steepest descent, Newton's, Pattern search and penalty methods.
CO3:	Explain the genetic algorithm and programming for engineering problems.
CO4:	Discuss the various applications of optimization in design and manufacturing systems.
CO5:	Explain the concept of reliability and its applications.

Syllabus

UNIT - I

CLASSICAL OPTIMIZATION TECHNIQUES: Single variable optimization with and without constraints, multi – Variable optimization without constraints, multi – Variable optimization with constraints – method of lagrange multipliers, Kuhn-Tucker conditions, merits and demerits of classical optimization techniques.

UNIT - II

NUMERICAL METHODS FOR OPTIMIZATION: Nelder Mead's Simplex search method, gradient of a function, steepest descent method, newton's method, pattern search methods, conjugate method, types of penalty methods for handling constraints, advantages of numerical methods.

UNIT - III

GENETIC ALGORITHM (GA) : Differences and similarities between conventional and evolutionary algorithms, working principle, reproduction, crossover, mutation, termination criteria, different reproduction and crossover operators, GA for constrained optimization, draw backs of GA,
GENETIC PROGRAMMING (GP): Principles of genetic programming, terminal sets, functional sets, differences between GA & GP, random population generation, solving differential equations using GP.
MULTI-OBJECTIVE GA: Pareto's analysis, non-dominated front, multi – objective GA, non-dominated sorted GA, convergence criterion, applications of multi-objective problems .

UNIT – IV

APPLICATIONS OF OPTIMIZATION IN DESIGN AND MANUFACTURING SYSTEMS: Some typical applications like optimization of path synthesis of a four-bar mechanism,

minimization of weight of a cantilever beam, optimization of springs and gears, general optimization model of a machining process, optimization of arc welding parameters, and general procedure in optimizing machining operations sequence.

UNIT -V

RELIABILITY: Concepts of Engineering Statistics, risk and reliability, probabilistic approach to design, reliability theory, design for reliability, numerical problems, hazard analysis.

Text Books:

1. Optimization for Engineering Design – Kalyanmoy Deb, PHI Publishers
2. Engineering Optimization – S.S.Rao, New Age Publishers.
3. Reliability Engineering by L.S.Srinath.
4. Multi objective genetic algorithm by Kalyanmoy Deb, PHI Publishers.

References:

1. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison- Wesley Publishers.
2. Multi objective Genetic algorithms - Kalyanmoy Deb, PHI Publishers.
3. Optimal design – JasbirArora, McGraw Hill (International)Publishers.
4. An Introduction to Reliability and Maintainability Engineering by CE Ebeling,Wavel and Printers Inc.,2009.
5. Reliability Theory and Practice by I Bazovsky, Dover Publications,2013.

University Nominee (Dr. B. Balakrishna)	Subject Expert (Dr. D. Ravi Kumar)	Industrial Expert (Mr. Rajiv Aramadaka)	Internal Member (Dr. P.M.M.S. Sarma)	Special Invitee Member (Dr. M.V.Sekhar Babu)
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Internal Member (Mr.M. Balakrishna)	Internal Member (Mr. P.VeeraRaju)	Internal Member (Mr. D. Suman)	Internal Member (Mr. G Ramakrishna)	Chairman, BoS (Dr. M. Sreenivasa Rao)

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2nd semester)			
Course Code	**Advanced Manufacturing Processes**				
Teaching	Total contact hours- 50	L	T	P	C
Prerequisite(s): Production Technology and Metal Cutting and Machine Tools.		3	0	0	3

Course Objectives:

- To understand surface treatment methods for different applications.
- To learn the concepts related to manufacturing of composites.
- To learn the fabrication methods of microelectronic devices and their applications.
- To understand working principles and applications of IBM, LBM, EDM and PAM.
- To understand working principle and methods of rapid prototyping.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Identify the suitable surface treatment technique for given application.
CO2:	Explain manufacturing techniques of composites.
CO3:	Discuss the working principle and fabrication methods of microelectronic devices.
CO4:	Describe working principle and applications of IBM, LBM, EBM and PAM.
CO5:	Discuss various rapid prototyping methods.

Syllabus

UNIT-I

SURFACE TREATMENT: Scope, cleaners, methods of cleaning, surface coating types, and ceramic and organic methods of coating, economics of coating.electro forming, chemical vapor deposition, thermal spraying, ion implantation, diffusion coating, diamond coating and cladding.

UNIT- II

PROCESSING OF CERAMICS: Applications, characteristics, classification .processing of particulate ceramics, powder preparations, consolidation, drying, sintering, hot compaction, area of application, finishing of ceramics.processing of composites: Composite Layers, particulate and fiber reinforced composites, elastomers, reinforced plastics, MMC, CMC, polymer matrix composites.

UNIT- III

FABRICATION OF MICROELECTRONIC DEVICES: Crystal growth and wafer preparation, film deposition oxidation, lithography, bonding and packaging, reliability and yield, printed circuit boards, computer aided design in micro electronics, surface mount technology, integrated circuit economics.

UNIT - IV

NON TRADITIONAL MACHINING PROCESSES: Principle, working, limitations, applications and selection of process parameters - EDM, Wire EDM, ECM, LBM, EBM, AJM, WJM.

UNIT -V

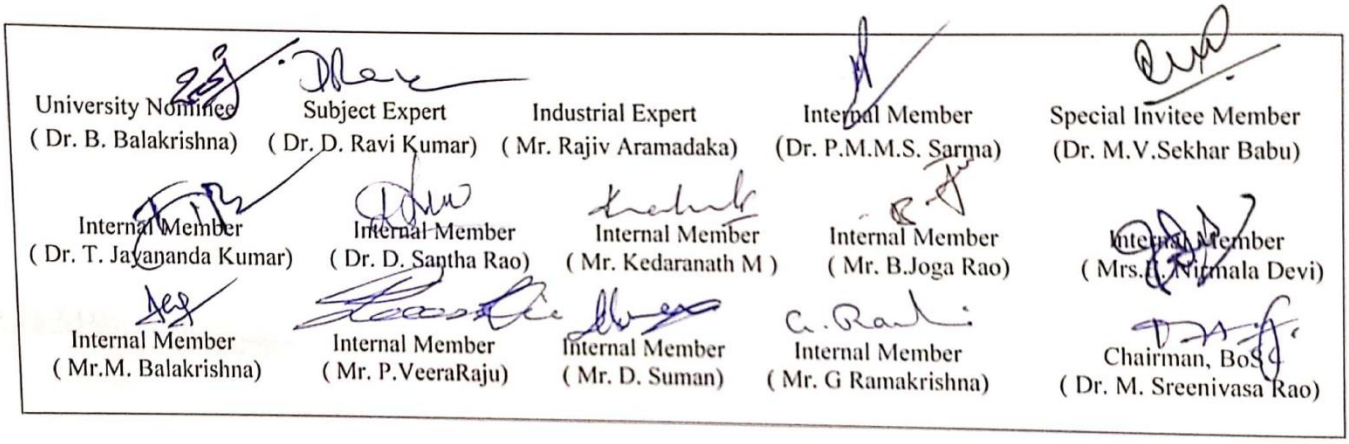
ADDITIVE MANUFACTURING: Working Principles, methods, stereo lithography, laser sintering, fused deposition method, applications and limitations, Arc based additive manufacturing.

Text Books:

1. Manufacturing Engineering and Technology *I* Kalpakijian / Adisson Wesley,1995.
2. Process and Materials of Manufacturing / R. A. Lindburg / 1th edition, PHI1990.

References:

1. Microelectronic packaging handbook / Rao. R. Thummala and Eugene, J. Rymaszewski/ Van NostrandRenihold,
2. MEMS & Micro Systems Design and manufacture / Tai — Run Hsu /TMGH
3. Advanced Machining Processes / V.K.Jain / Allied Publications.
4. Introduction to Manufacturing Processes / John A Schey*I*McGrawHill.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2nd semester)			
Course Code	**Additive Manufacturing (Elective-III)**				
Teaching	Total contact hours- 50	L	T	P	C
Prerequisite(s): Engineering Physics, Computer Aided Design		3	0	0	3

Course Objectives:

- To learn the principles of additive manufacturing processes.
- To gain knowledge on generation of layer information for additive manufacturing.
- To understand the working principle of rapid prototyping machines.
- To understand the concept of rapid prototyping and tooling.

Course Outcomes:

On Completion of the course, the students will be able-	
CO1:	Identify part orientation and suitable slicing algorithms for minimum build time, support material and part errors.
CO2:	Discuss working principle of rapid prototyping machines.
CO3:	Explain the strategic, operational aspects for the use of prototypes and their applications.
CO4:	Discuss indirect rapid tooling for producing plastic and metallic components.
CO5:	Discuss direct tooling techniques for producing plastic and metallic components.

Syllabus

UNIT- I

ADDITIVE MANUFACTURING PROCESS: Basic principles of the Additive Manufacturing process - Generation of layer information, physical principles for layer generation, elements for generating the physical layer - Classification of Additive Manufacturing processes - Evaluation of the theoretical potentials of Rapid Prototyping processes.

UNIT -II

MACHINES FOR RAPID PROTOTYPING: Overview of Polymerization, Stereolithography (SL) - Sintering/Selective Sintering: Melting in the powder bed, layer Laminate Manufacturing (LLM) and Three-Dimensional Printing (3DP).

UNIT -III

RAPID PROTOTYPING: Classification and definition, strategic aspects for the use of prototypes, applications of Rapid Prototyping in industrial product development - Rapid Tooling: classification and definition of terms, properties of Additive Manufactured tools, indirect Rapid Tooling.

UNIT -IV

TOOLING PROCESSES: Molding processes and follow-up processes, indirect methods for the manufacture of tools for plastic components, indirect methods for the manufacture of metal components.

UNIT -V

DIRECT RAPID TOOLING PROCESSES: Prototype Tooling: tools based on plastic Rapid Prototyping models and methods, metal tools based on multilevel AM processes - Direct Tooling: tools based on metal Rapid

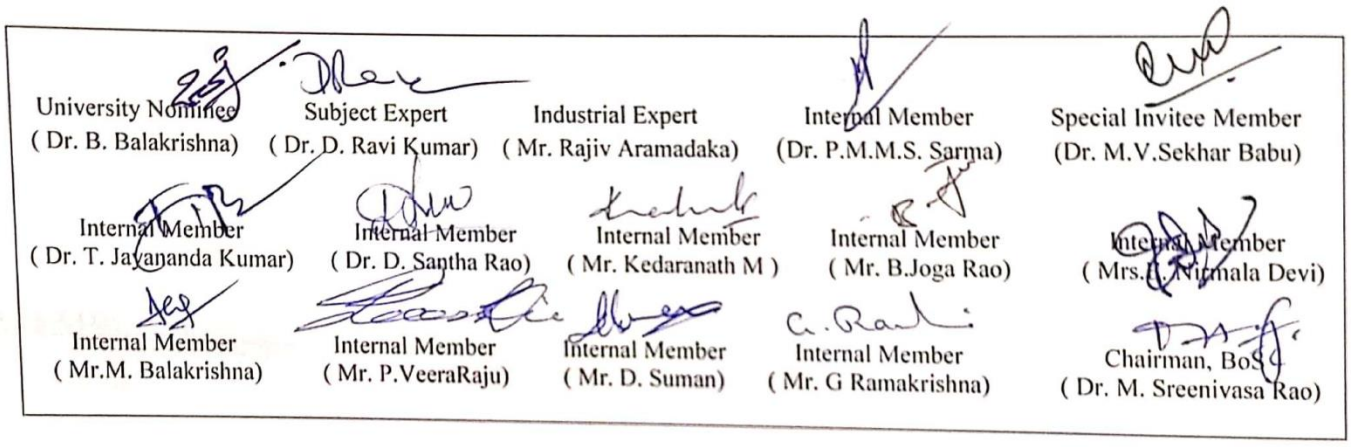
Prototype processes.

Text Books:

1. Additive Manufacturing: 3D Printing for Prototyping and Manufacturing, Andreas Gebhardt, Jan-Steffen Hötter,1st edition, Hanser Publications
2. Additive Manufacturing Technologies:3D Printing, Rapid Prototyping, and Direct Digital Manufacturing, Ian Gibson, David Rosen, Brent Stucker, 2nd edition, Springer.

References:

1. Rapid Prototyping and Engineering applications: A tool box for prototype development, LiouL.W, Liou F W,1st edition, CRC Press.
2. Rapid Prototyping: Theory and practice, KamraniA.K. and NasrE.A., Springer
3. Rapid Tooling: Technologies and Industrial Applications, Hilton P.D. and JacobsP.F., 1st edition, CRC press.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2nd semester)			
Course Code	**Hydraulic and Pneumatic Systems (Elective-III)**				
Teaching	Total contact hours- 50	L	T	P	C
Prerequisite(s): Fluid Mechanics and Hydraulic Machinery		3	0	0	3

Course Objectives:

- To provide student with knowledge on the application of fluid power in process, construction and manufacturing Industries.
- To provide students with an understanding of the fluids and components utilized in modern industrial fluid power system.
- To develop a measurable degree of competence in the design, construction and operation of fluid power circuits.

Course Outcomes:

On Completion of the course, the students will be able-	
CO1:	Explain the Fluid power and operation of different types of pumps.
CO2:	Summarize the features and functions of Hydraulic motors, actuators and Flow control valves
CO3:	Explain the different types of Hydraulic circuits and systems
CO4:	Explain the working of different pneumatic circuits and systems
CO5:	Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

Syllabus:

UNIT- I

FLUID POWER PRINICIPLES AND HYDRAULIC PUMPS: Introduction to Fluid power – Advantages and Applications – Fluid power systems – Types of fluids – Properties of fluids and selection – Basics of Hydraulics – Pascal's Law – Principles of flow – Friction loss – Work, Power and Torque Problems, Sources of Hydraulic power : Pumping Theory – Pump Classification – Construction, Working, Design, Advantages, Disadvantages, Performance, Selection criteria of Linear and Rotary – Fixed and Variable displacement pumps –Problems.

UNIT- II

HYDRAULIC ACTUATORS AND CONTROL COMPONENTS: Hydraulic Actuators: Cylinders – Types and construction, Application, Hydraulic cushioning – Hydraulic motors – Control Components: Direction Control, Flow control and pressure control valves – Types, Construction and Operation – Servo and Proportional valves – Applications – Accessories: Reservoirs, Pressure Switches – Applications – Fluid Power ANSI Symbols –Problems.

UNIT -III

HYDRAULIC CIRCUITS AND SYSTEMS: Accumulators, Intensifiers, Industrial hydraulic circuits – Regenerative, Pump Unloading, Double- Pump, Pressure Intensifier, Air-over oil, Sequence, Reciprocation, Synchronization, Fail-Safe, Speed Control, Hydrostatic transmission, Electro hydraulic circuits, Mechanical hydraulic servo systems.

UNIT -IV

PNEUMATIC AND ELECTRO PNEUMATIC SYSTEMS: Properties of air – Perfect Gas Laws – Compressor – Filters, Regulator, Lubricator, Muffler, Air control Valves, Quick Exhaust Valves, Pneumatic actuators, Design of Pneumatic circuit – Cascade method – Electro Pneumatic System – Elements – Ladder diagram – Problems, Introduction to fluidics and pneumatic logic circuits.

UNIT -V

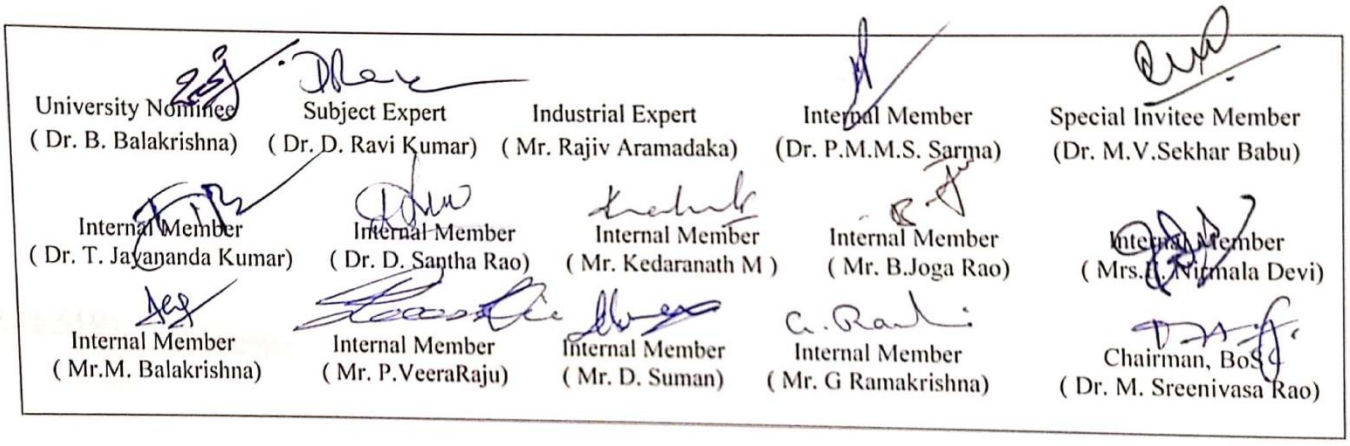
TROUBLE SHOOTING AND APPLICATIONS: Installation, Selection, Maintenance, Trouble Shooting and Remedies in Hydraulic and Pneumatic systems, Design of hydraulic circuits for Drilling, Planning, Shaping, Surface grinding, Press and Forklift applications. Design of Pneumatic circuits for Pick and Place applications and tool handling in CNC Machine tools – Low cost Automation – Hydraulic and Pneumatic power packs.

Text Books:

1. Fluid Power with Applications, Anthony Esposito, Pearson Education 2005.
2. Oil Hydraulics Systems- Principles and Maintenance, Majumdar S.R., Tata McGraw- Hill, 2001.

Reference Books:

1. Principles of Hydraulic Systems Design, Second Edition, by Peter Chapple.
2. Pneumatic Drives: System Design, Modeling and Control by Peter Beater.
3. Analysis and Design of Pneumatic System by Blaine W Andersen.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2^{nd} semester)			
Course Code	**Modeling and Simulation of Manufacturing Systems (Elective-III)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Operations Research, Optimization Techniques		3	0	0	3

Course Objectives:

- To learn concepts of modeling and simulation.
- To learn the validation of simulated models.
- To understand random number generation and simulation languages.
- To learn simulation data output analysis using different methods.
- To learn the various applications of simulation in flow and job shop, inventory and queuing models.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain analytical models and simulation in manufacturing systems.
CO2:	Illustrate techniques for verification and validation of simulation models.
CO3:	Discuss concepts of random number generation and simulation languages.
CO4:	Assess simulation data output analysis using different methods.
CO5:	Use simulation to solve queuing, inventory and scheduling problems.

Syllabus

UNIT – I

SYSTEM: Ways to analyze the system - Model - Types of models - Simulation - Definition - Types of simulation models - Steps involved in simulation - Advantages & Disadvantages. Parameter estimation-estimator - Properties - Estimate - point estimate – Confidence interval estimates-Independent-Dependent-hypothesis - Types of hypothesis- step - types l & 2 errors - Framing - String law of large numbers.

UNIT - II

BUILDING OF SIMULATION MODEL VALIDATION: Verification - Credibility - Their timing - Principles of valid simulation Modeling - Techniques for verification - Statistical procedures for developing credible model. Modeling of stochastic input elements - Importance - Various procedures - Theoretical distribution - continuous - Discrete their suitability in modeling.

UNIT - III

GENERATION OF RANDOM VARIABLES: Factors for selection methods - Inverse transform – Composition convolution - Acceptance - Rejection - Generation of random variables - Exponential-Uniform-Weibull-normal Bernoullie - Binomial uniform - Poisson - Simulation languages - comparison of simulation languages with general purpose languages Simulation languages vs Simulators - Software features - statistical capabilities - G P S S - S1MAN- SIMSCRIPT - Simulation of WMJI queue - Comparison of simulation languages.

UNIT - IV

OUTPUT DATA ANALYSIS: Types of Simulation w. r. t output data analysis - Warm up period- Welch algorithm - Approaches for Steady- State Analysis- Replication- Batch means methods- Corn pan Sons.

UNIT - V

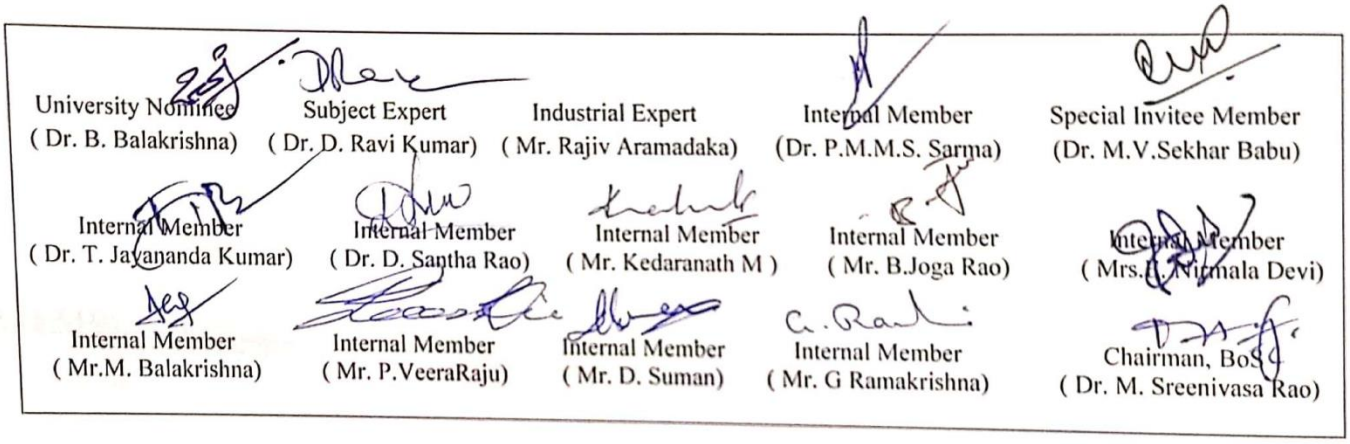
APPLICATIONS OF SIMULATION: Flow shop system- Job shop system - M/MI1 queues with infinite and finite capacities - Simple fixed period inventory system - News paper boy problem.

Text Books:

1. Simulation Modelling and Analysis / Law, A.M.&Kelton / McGraw Hill, Edition/ New York, 1991.
2. Simulation of Manufacturing Systems / Carrie A. / Wiley, NY, 1990.

References:

1. Discrete Event System Simulation I Banks J. & Carson J.S., PH IEnglewood Cliffs N/ 1984.
2. A Course in Simulation / Ross, S.M., McMillan, NY, 1990.
3. Simulation Modelling and S1MNET/ Taha HA. / PH, Englewood Cliffs, NJ, 1987.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2 semester)			
Course Code	**Materials Characterization Techniques (Elective-IV)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Metallurgy and Material Science		3	0	0	3

Course Objectives:

- To learn the different characterization techniques.
- To learn the methods of specimen preparation.
- To understand working principle and applications of optical microscopes.
- To learn the uses of scanning electron microscope and transmission electron microscope.

Course Outcomes:

On Completion of the course, the students will be able-	
CO1:	Identify different materials characterization techniques.
CO2:	Discuss the working principle of optical, scanning electron and transmission electron microscopy and their applications.
CO3:	Explain the thermal characterization techniques.
CO4:	Describe magnetic characterization techniques.
CO5:	Discuss the optical and electronic characterization techniques.

Syllabus

UNIT- I

INTRODUCTION TO MATERIALS CHARACTERIZATION TECHNIQUES, STRUCTURE ANALYSIS TOOLS: X-ray diffraction: phase identification, indexing and lattice parameter determination - Analytical line profile fitting using various models, neutron diffraction - Reflection High Energy Electron Diffraction, and low energy electron diffraction.

UNIT -II

MICROSCOPY TECHNIQUES: Introduction, optical principles, construction, specimen preparation-metallographic principles, imaging modes, applications and limitations of optical microscopy - scanning electron microscopy (SEM) - Rutherford backscattering spectrometry (RBS) - energy dispersive X-ray microanalysis (EDS) -atomic force microscopy (AFM) and scanning probe microscopy(SPM) - transmission electron microscopy(TEM).

UNIT- III

THERMAL ANALYSIS TECHNIQUE: Importance of thermal characterization techniques, working principle, differences, accuracy, sensitivity, calibration and applications of Differential thermal analysis (DTA) - Differential Scanning Calorimetry (DSC) - Thermo gravimetric analysis (TGA) - Electrical characterization techniques , electrical resistivity, hall effect, magneto resistance.

UNIT- IV

MAGNETIC CHARACTERIZATION TECHNIQUES: Introduction to magnetism, measurement methods, measuring magnetization by force, measuring magnetization by induction method, types of measurements using magnetometers: M-H loop, temperature dependent magnetization, time dependent magnetization, Measurements using AC susceptibility, magneto-optical kerr effect, nuclear magnetic resonance, electron spin resonance.

UNIT –V

OPTICAL AND ELECTRONIC CHARACTERIZATION TECHNIQUES: UV-VIS spectroscopy - Fourier transform infrared spectroscopy - Raman spectroscopy - X-ray photoelectron spectroscopy.

Text Books:

1. Characterization of Materials (Materials Science andTechnology: A Comprehensive Treatment, Vol 2A &2B,VCH(1992).
2. Semiconductor Material and Device Characterization, 3rdEdition, D.K. Schroder, Wiley-IEEE Press(2006).
3. Materials Characterization Techniques, S Zhang, L. Li and Ashok Kumar, CRC Press (2008).

References:

1. Physical methods for Materials Characterization, P. E. J.Flewitt and R K Wild, IOP Publishing (2003).
2. Characterization of Nanophase materials, Ed. Z L Wang,Willet-VCH(2000).

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Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2^{nd} semester)			
Course Code	**Automation in Manufacturing (Elective-IV)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): CAD/CAM		3	0	0	3

Course Objectives:

- To gain the knowledge on basic concepts of automation.
- To understand the concepts of material handling systems.
- To learn about line balancing methods.
- To learn the fundamentals of automated assembly systems.
- To attain the knowledge on quality control & support systems.

Course Outcomes:

On Completion of the course, the students will be able-	
CO1:	Explain the different fundamental concepts of automation & its tools.
CO2:	Classify the automated material handling ,automated storage & retrieval systems in industries.
CO3:	Analyze the automated production lines & line balancing methods.
CO4:	Discuss the fundamentals of automated assembly systems.
CO5:	Assess the concepts of quality control & support systems.

Syllabus

UNIT – I

OVER VIEW OF MANUFACTURING AND AUTOMATION: Production systems, Automation in production systems, Automation principles and strategies, Manufacturing operations, production facilities. Basic elements of an automated system, levels of automation; Hardware components for automation and process control, programmable logic controllers and personal computers.

UNIT – II

MATERIAL HANDLING AND IDENTIFICATION TECHNOLOGIES: Material handling, equipment, Analysis. Storage systems, performance and location strategies, Automated storage systems, AS/RS, types. Automatic identification methods, Barcode technology, RFID.

UNIT – III

MANUFACTURING SYSTEMS AND AUTOMATED PRODUCTION LINES: Manufacturing systems: components of a manufacturing system, Single station manufacturing cells; Manual Assembly lines, line balancing Algorithms, Mixed model Assembly lines, Alternative Assembly systems. Automated production lines, Applications, Analysis of transfer lines.

UNIT – IV

AUTOMATED ASSEMBLY SYSTEMS: Fundamentals, Analysis of Assembly systems.Cellular manufacturing, part families, cooling, production flow analysis. Group Technology and flexible Manufacturing systems, Quantitative Analysis.

UNIT – V

QUALITY CONTROL AND SUPPORT SYSTEMS: Quality in Design and manufacturing, inspection principles and strategies, Automated inspection, contact Vsnon contact, CMM. Manufacturing support systems. Quality function deployment, computer aided process planning, concurrent engineering, shop floor control, just in time and lean production.

Text Books:

1. Automation, production systems and computer integrated manufacturing/ Mikell. P Groover/PHI/3rd edition/2012.
2. CAD/CAM/CIM/ P. Radha Krishnan & S. Subrahamanyarn and Raju/New Age International Publishers/2003.

References:

1. System Approach to Computer Integrated Design and Manufacturing/ Singh/John Wiley /96.
2. Computer Aided Manufacturing/Tien-Chien Chang, Richard A. Wysk and Hsu-Pin Wang/ Pearson/ 2009.
3. Manufacturing and Automation Technology / R Thomas Wright and Michael Berkeihiser / Good Heart/Willcox Publishers.

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Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. IISem (2nd semester)			
Course Code	**Finite Element Method (Elective-IV)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Finite Element Methods		3	0	0	3

Course Objectives:

- To learn principles and methodology of Finite Element Analysis (FEA) procedure.
- To learn the characteristics and applications of Finite Elements in Engineering structures.
- To learn and apply Finite Element approach in solving Structural and Thermal Problems.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Use the concepts of variational and weighted residual methods in FEA.
CO2:	Identify the applications and characteristics of Finite Elements in one-dimensional structural and thermal problems.
CO3:	Develop element characteristic equation and generate global stiffness matrices for structural and thermal analyses.
CO4:	Identify the parametric elements and their refinement to solve problems.
CO5:	Solve the structural problems under static and dynamic conditions.

Syllabus

UNIT - I

FORMULATION TECHNIQUES: Methodology, Engineering problems and governing differential equations, finite elements, Variational methods-potential energy method, Raleigh Ritz method, strong and weak forms, Galerkin and weighted residual methods, calculus of variations, Essential and natural boundary conditions.

UNIT – II

ONE-DIMENSIONAL ELEMENTS: Bar, trusses, beams and frames, displacements, stresses and temperature effects.

UNIT – III

TWO DIMENSIONAL PROBLEMS: CST, LST, four noded and eight nodded rectangular elements, Lagrange basis for triangles and rectangles, serendipity interpolation functions. Axisymmetric Problems: Axisymmetric formulations, Element matrices, boundary conditions. Heat Transfer problems: Conduction and convection, examples: - two-dimensional fin.

UNIT – IV

ISOPARAMETRIC FORMULATION: Concepts, sub parametric, super parametric elements, numerical integration, Requirements for convergence, h-refinement and p-refinement, complete and incomplete interpolation functions, Pascal's triangle, Patch test.

UNIT – V

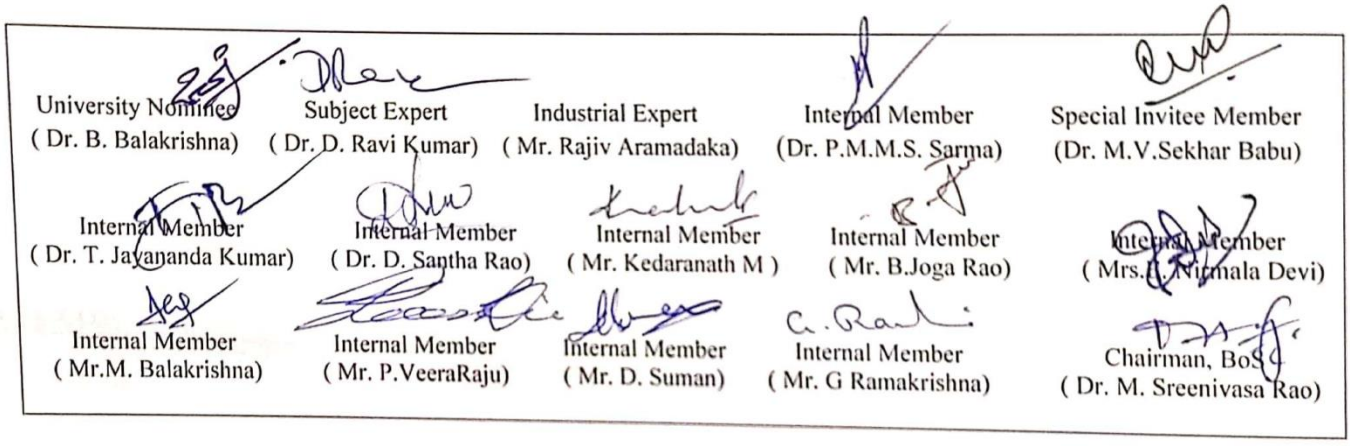
FINITE ELEMENTS IN STRUCTURAL ANALYSIS: Static and dynamic analysis, eigen value problems, and their solution methods, case studies using commercial finite element packages.

Text Book :

1. Finite element methods by Chandrupatla & Belagundu.

References:

1. J.N. Reddy, Finite element method in Heat transfer and fluid dynamics, CRCpress,1994.
2. Zienckiwicz O.C. & R. L. Taylor, Finite Element Method,McGraw-Hill,1983.
3. K. J. Bathe, Finite element procedures, Prentice-Hall,1996.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2nd semester)			
Course Code	**Simulation of Manufacturing Processes Lab**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Computer Aided Design ,Finite Element Methods, Strength of Material, Production Technology		0	0	4	2

Course Objectives:

- To learn the simulation of rolling and punching process through numerical software.
- To learn simulation techniques for cold working and hot working processes.
- To understand simulation of turning and milling operation in numerical software.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Simulate solidification behavior in metal casting process.
CO2:	Investigate deformation behavior in bulk forming processes.
CO3:	Apply simulation techniques to analyze deformation behavior in sheet metal forming processes.
CO4:	Simulate welding processes.
CO5:	Generate tool path for turning and milling operations.

List of Experiments:

1. Casting processes - Simulation of Solidification, temperatures, Residual stresses, metallurgical phases etc.

2. Bulk Forming processes - Simulation of cold working and hot working processes for extrusion, drawing, rolling etc.
   a) Simulation of 2D rolling operation.
   b) Simulation of 3D rolling operation
   c) Explicit simulation of Punching
   d) Structural analysis of Hammering.
   e) Simulation of 2D cold drawing.
   f) Simulation of 2D hot drawing.

3. Sheet Metal Forming Processes – Simulation of blanking, bending, deep drawing etc.
   a) Simulation of deep drawing in forming process.
   b) Simulation of bending process.

4. Welding Processes – Simulation of arc, spot, laser welding etc

5. Machining Processes- Simulation of Turning, Milling and Shaping operations.
   a) Generation of NC code for turning operation.
   b) Generation of NC code for pocket milling operation.

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Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech. II Sem (2nd semester)			
Course Code	**Material Characterization Lab**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Strength of Materials		0	0	4	2

Course Objectives:

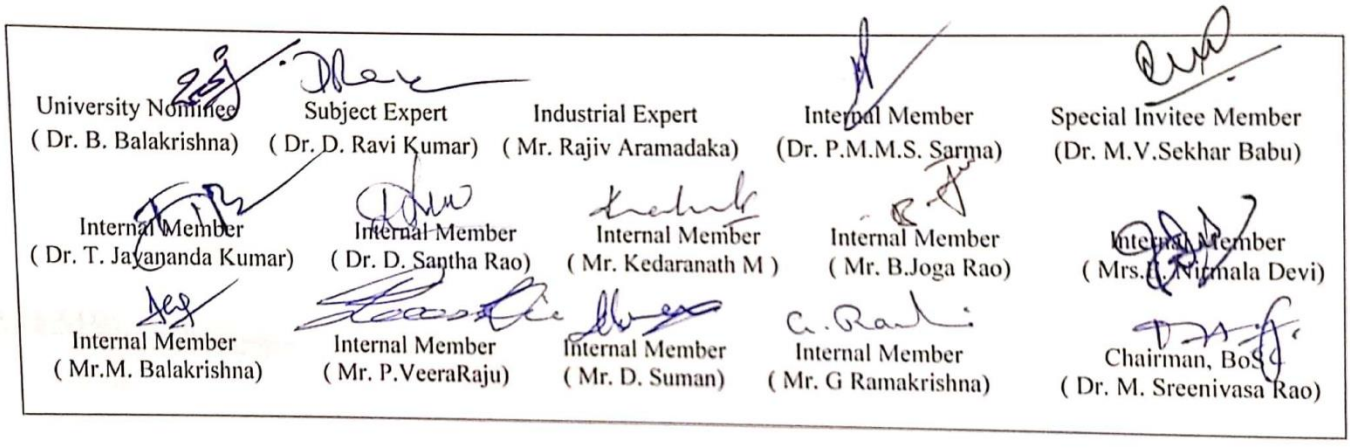
- To learn the different characterization techniques.
- To learn the methods of specimen preparation.
- To understand working principle and applications of optical microscopes.
- To learn the uses of scanning electron microscope and transmission electron microscope.

Course Outcomes:

On Completion of the course, the students will be able-	
CO1:	Assess the grain size of the different structures.
CO2:	Determine the hardness of materials by using different methods.
CO3:	Determine the tensile properties of steels.
CO4:	Examine the compressive strength of different materials.
CO5:	Assess the wear properties of ferrous and non-ferrous materials.

List of Experiments

1. Microscopy: Different microscopy techniques, Resolution, Magnification, Depth of field Imaging – theory and concepts.
2. Optical Microscopy: Grain size estimation, Phase Percentage Estimation
3. Micro hardness evaluation of Ferrous and Non ferrous metals.
4. Testing of Tensile Properties of mild steel material
5. Testing of Compression Properties
6. Testing of Flexural Strength on Ferrous metals.
7. Evaluation of Tribological properties of Ferrous and Non ferrous metals through Pin on Disc Tester.



Audit Course-II

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IM.Tech			
Course Code	CONSTITUTION OF INDIA				
Teaching	Totalcontacthours–32	L	T	P	C
Prerequisite(s)Learner is assured with intellectual constitutional role and entitlement to civil and economic rights		2	0	0	0

Course Objectives:
This Course aims to make the Learner:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- Address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
- Address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
CO2:	Discuss the intellectual origins of the frame work of argument that informed the conceptualization of social reforms leading to revolution in India.
CO3:	Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution
CO4:	Discuss the passage of the Hindu Code Bill of1956.

Units	Syllabus
1	**History of Making of the Indian Constitution:** History Drafting Committee (Composition& Working)
2	**Philosophy of the Indian Constitution:** Preamble Salient Features

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

3	**Contours of Constitutional Rights & Duties:** Fundamental Rights Right to Equality Right to Freedom Right against Exploitation Right to Freedom of Religion Cultural and EducationalRights Right to Constitutional Remedies Directive Principles of State Policy Fundamental Duties.
4	**Organs of Governance:** Parliament Composition Qualifications and Disqualifications Powers and Functions Executive President Governor Council of Ministers Judiciary, Appointment and Transfer of Judges, Qualifications Powers and Functions
5	**Local Administration:** District's Administration head: Role and Importance, Municipalities: Introduction, Mayor and role of Elected Representative, CE of Municipal Corporation. Pachayati raj: Introduction, PRI: ZilaPachayat. Elected officials and their roles, CEO ZilaPachayat: Position and role. Block level: Organizational Hierarchy (Different departments), Village level: Role of Elected and Appointed officials, Importance of grass root democracy

Suggested reading

1. The Constitution of India, 1950 (Bare Act), GovernmentPublication.
2. Dr. S. N. Busi, Dr. B. R. Ambedkar framing of Indian Constitution, 1st Edition,2015.
3. M. P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis,2015.

Approval of External BOS:

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(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

CO-PO Mapping:
(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	2	2	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	-	3	3	-	-	-
CO4	-	-	-	-	-	-	-	2	3	-	-	-

INTERNAL MEMBERS OF BOS

1.Ms.S.Sunila Sailaja Asst.Prof -CHIARMAN-BOS

2. Ms B.L. Ratnavali 3. Ms D.V.L. Shanthi 4. Ms M.Kareesa Prabhu Priya 5. Mr.K. Ramaiah 6.Kiran Kumar
Assoc.Prof Asst.Prof Asst.Prof Asst.Prof Asst.Prof

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Regulation GRBT-20	Godavari Institute of Engineering & Technology (Autonomous)	IM.Tech			
Course Code	PEDAGOGY STUDIES				
Teaching	Totalcontacthours–32	L	T	P	C
Prerequisite(s)	Learner is strengthened with the modes of instructional strategies and learning environment	2	0	0	0

Course Objectives:

This Course aims to make the learner

- Review existing evidence on the review topic to inform programme design and policy making undertaken by the DFID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Identify what pedagogical practices are being used by teachers in formal and informal classrooms in developing countries.
CO2:	Understand what is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
CO3:	Know how can teacher education (curriculum and practicum) and the school Curriculum and guidance materials best support effective pedagog

Units	Syllabus
1	Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.
2	Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.
3	Evidence on the effectiveness of pedagogical practices Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?
4	Theory of change.Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.

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(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

5	Professional development: alignment with classroom practices and follow-up supportPeer support Support from the head teacher and the community. Curriculum and assessment Barriers to learning: limited resources and large class sizes

Suggested Reading:

1. Ackers J, Hardman F (2001) Classroom interaction in Kenyan primary schools, Compare, 31 (2): 245-261.
2. Agrawal M (2004) Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36 (3): 361-379.
3. Akyeampong K (2003) Teacher training in Ghana - does it count? Multi-site teacher education research project (MUSTER) country report 1. London:DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33 (3):272–282.
5. Alexander RJ (2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston:Blackwell.
6. Chavan M (2003) Read India: A mass scale, rapid, 'learning to read'campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf.

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	2	2	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	-	3	3	-	-	-

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Assoc.ProfAsst.ProfAsst.ProfAsst.ProfAsst.Prof

Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Regulation GRBT-20	**Godavari Institute of Engineering & Technology (Autonomous)**	**IM.Tech.**			
Course Code	**PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS**				
Teaching	**Totalcontacthours–32**	**L**	**T**	**P**	**C**
Prerequisite(s)Learner should get motivation and encouragement towards their goals and career options		**2**	**0**	**0**	**0**

Course Objectives
This Course aims:

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

Course Outcomes:

C

On Completion of the course, the students will be able to	
CO1:	Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
CO2:	Stand as a person who has studied Geeta will lead the nation and mankind to peace and prosperity.
CO3:	Study Neeti shatakamthat will help in developing versatile personality ofstudents

Unit	Syllabus
1	Neetisatakam-Holistic development of personality Verses-19,20,21,22 (wisdom)Verses- 29,31,32 (pride & heroism) Verses- 26,28,63,65 (virtue)
2	Neetisatakam-Holistic development of personality Verses-52,53,59 (dont's)Verses- 71,73,75,78 (do's)
3	Approach to day to day work and duties. Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48,
4	Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48.
5	Statements of basic knowledge. Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18

Approval of External BOS:

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(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Suggested reading

- "Srimad Bhagavad Gita" by Swami SwarupanandaAdvaita Ashram (Publication Department), Kolkata
- Bhartrihari's Three Satakam (Niti-sringar-vairagya) by P.Gopinath, Rashtriya Sanskrit Sansthanam, NewDelhi.

CO-PO Mapping:
1: Slight [Low]; 2: Moderate [Medium]; 3: Substantial [High], '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	2	2	-	-	-
CO2	-	-	-	-	-	-	-	3	-	-	-	1
CO3	-	-	-	-	-	-	-	3	3	-	-	-

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Approval of External BOS:

Dr. D.S.Kesava Rao (Prof.NIT Warangal)
(University nominee/subject expert)

Dr .K.S.Ramesh (Prof.AKNU,Rjy)
(University nominee/subject expert)

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	II M.Tech. I Sem (3rd semester)			
Course Code	**Quality Engineering in Manufacturing (Elective-V)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Industrial Engineering, Engineering Metrology.		3	0	0	3

Course Objectives:

- To understand the concepts of quality.
- To learn the concepts of geometrical dimensioning and tolerancing.
- To understand the concepts of ANOVA and orthogonal arrays.
- To understand the six sigma and its implementation.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Discuss the concepts of quality.
CO2:	Use the various methods of tolerance design and tolerancing.
CO3:	Solve the various quality related problems using ANOVA.
CO4:	Explain the orthogonal arrays and conduction of experiments.
CO5:	Explain the six sigma and its implementation.

Syllabus

UNIT- I

QUALITY VALUE AND ENGINEERING: An overall quality system, quality engineering in production design, quality engineering in design of production processes. Loss Function and Quality Level: Derivation and use of quadratile loss function, economic consequences of tightening tolerances as a means to improve quality, evaluations and types tolerances.(N-type,S- type and L-type)

UNIT-II

TOLERANCE DESIGN AND TOLERANCING: Functional limits, tolerance design for N- type. L-type and S-type characteristics, tolerance allocation fbr multiple components. Parameter and Tolerance Design: Introduction to parameter design, signal to noise ratios, Parameter design strategy, some of the case studies on parameter and tolerance designs.

UNIT – III

ANALYSIS OF VARIANCE (ANOVA): Introduction to ANOVA, Need for ANOVA, NO- way ANOVA, One-way ANOVA, Two-way ANOVA, Critique of F-test, ANOVA for four level factors, multiple level factors.

UNIT - IV

ORTHOGONAL ARRAYS: Typical test strategies, better test strategies, efficient test strategies, steps in designing, conducting and analyzing an experiment. Interpolation of Experimental Results: Interpretation methods, percent contributor, estimating the mean.

UNIT - V

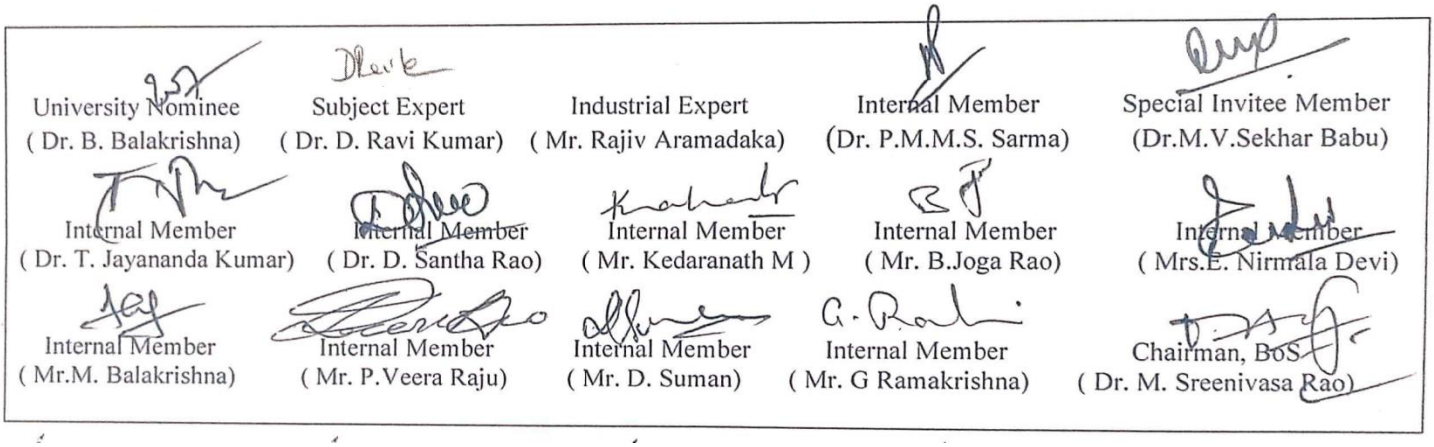
SIX SIGMA AND THE TECHNICAL SYSTEM: Six sigma DMAIC methodology, tools for process improvement, six sigma in services and small organizations, statistical foundations, statistical methodology, ISO 9000 standards.

Text Book:

1. Taguchi Techniques for Quality Engineering / Phillip J. Ross / McGraw Hill/ Intl. II Edition, 1995.

References:

1. Quality Engineering in Production systems by G. Taguchi, A. Elsayed et al, McGraw HillIntl. Pub 1989.
2. Taguchi Methods explained: Practical steps to Robust Design / Papan P. Bagchi*I*Prentice Hall Pvt.Ltd. New Delhi.



Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	II M.Tech. ISem (3 semester)			
Course Code	**Green Manufacturing (Elective-V)**				
Teaching	Total contact hours- 60	L	T	P	C
Prerequisite(s): Environmental Science, Advanced Materials.		3	0	0	3

Course Objectives:

- To understand sustainable manufacturing, green product and process.
- To understand the principles, methodologies, techniques in green manufacturing.
- To learn the life cycle of production systems.
- To discuss the environmental implications of nano-manufacturing.
- To understand the packaging and the supply chain of green manufacturing.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1:	Explain the basic design concepts and the operation of sustainable green manufacturing.
CO2:	List the principles, methods,techniques in green manufacturing.
CO3:	Illustrate the life cycle of production systems.
CO4:	Explain the environmental implications of nano-manufacturing.
CO5:	Discuss the packaging and the supply chain of green manufacturing.

Syllabus

UNIT- I

INTRODUCTION TO GREEN MANUFACTURING: Why Green Manufacturing, Motivations and Barriers to Green Manufacturing, Environmental Impact of Manufacturing, Strategies for Green Manufacturing.

THE SOCIAL, BUSINESS, AND POLICY ENVIRONMENT FOR GREEN MANUFACTURING: Introduction, The Social Environment—Present Atmosphere and Challenges for Green Manufacturing, The Business Environment: Present Atmosphere and Challenges, The Policy Environment—Present Atmosphere and Challenges for Green Manufacturing.

UNIT-II

METRICS FOR GREEN MANUFACTURING: Introduction, Overview of Currently Used Metrics, Overview of LCA Methodologies, Metrics Development Methodologies, Outlook and Research Needs.

GREEN SUPPLY CHAIN: Motivation and Introduction, Definition, Issues in Green Supply Chains (GSC),Techniques/Methods of Green Supply Chain, Future of Green Supply Chain.

PRINCIPLES OF GREEN MANUFACTURING: Introduction, Background, and Technology Wedges, Principles, Mapping Five Principles to Other Methods and Solutions.

UNIT-III

CLOSED-LOOP PRODUCTION SYSTEMS: Life Cycle of Production Systems, Economic and Ecological Benefits of ClosedLoop Systems, Machine Tools and Energy Consumption, LCA of Machine Tools, Process Parameter Optimization, Dry Machining and Minimum Quantity Lubrication, Remanufacturing, Reuse, Approaches for Sustainable Factory Design.

SEMICONDUCTOR MANUFACTURING: Overview of Semiconductor Fabrication, Micro fabrication Processes, Facility Systems, Green Manufacturing in the Semiconductor Industry: Concepts and Challenges, Use-Phase Issues with Semiconductors, Example of Analysis of Semiconductor Manufacturing.

UNIT-IV

ENVIRONMENTAL IMPLICATIONS OF NANO-MANUFACTURING: Introduction, Nano-manufacturing Technologies, Conventional Environmental Impact of Nano-manufacturing, Unconventional Environmental Impacts of Nano-manufacturing, Life Cycle Assessment (LCA) of Nanotechnologies.

GREEN MANUFACTURING THROUGH CLEAN ENERGY SUPPLY: Introduction, Clean Energy Technologies, Application Potential of Clean Energy Supplying Green Manufacturing.

UNIT-V

PACKAGING AND THE SUPPLY CHAIN: A LOOK AT TRANSPORTATION Introduction, Background, Recommended Method to Determine Opportunities for Improved Pallet Utilization, Discussion.

ENABLING TECHNOLOGIES FOR ASSURING GREEN MANUFACTURING: Motivation, Process Monitoring System, Applying Sensor Flows in Decision Making: Automated Monitoring, Case Study.

Text Books:

1. Green Manufacturing, Dornfield David, Springer, 2012.
2. Green Manufacturing Processes and Systems, Davim.J.Pauls, Springer, 2013.

References:

1. Costing the earth – Cairncrss and Francis – Harvard Business School Press – 2009
2. Industrial Ecology, Gradel.T.E. and B.R. Allenby – – Prentice Hall – 2010
3. World Commission on Environment and Development (WCED), Our Common Future, Oxford University Press, 2005.

University Nominee (Dr. B. Balakrishna)	Subject Expert (Dr. D. Ravi Kumar)	Industrial Expert (Mr. Rajiv Aramadaka)	Internal Member (Dr. P.M.M.S. Sarma)	Special Invitee Member (Dr. M.V.Sekhar Babu)
Internal Member (Dr. T. Jayananda Kumar)	Internal Member (Dr. D. Santha Rao)	Internal Member (Mr. Kedaranath M)	Internal Member (Mr. B.Joga Rao)	Internal Member (Mrs. L. Nirmala Devi)
Internal Member (Mr.M. Balakrishna)	Internal Member (Mr. P.VeeraRaju)	Internal Member (Mr. D. Suman)	Internal Member (Mr. G Ramakrishna)	Chairman, BoS (Dr. M. Sreenivasa Rao)

OPEN ELECTIVE FROM OTHER DEPARTMENTS

II Year - I Semester		L	T	P	C
		3	0	0	3
Open Elective – **Composite Materials, Cost Management of Engineering Projects**					

Course Outcomes: At the end of the course, the student will be able to

CO1	Identify, describe and evaluate the properties of fibre reinforcements, polymer matrix materials and commercial composites.
CO2	Develop competency in one or more common composite manufacturing techniques, and be able to select the appropriate technique for manufacture of fibre-reinforced composite products.
CO3	Apply knowledge of composite mechanical performance and manufacturing methods to a composites design project
CO4	Understand project characteristics and various stages of a project. Market, Technical, Financial and Economic
C05	Analyze the learning and understand techniques for Project planning, scheduling and Execution Control

Mapping of Course Outcomes with Program Outcomes:

Course Out Comes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	--	--	--	--	--	--	--
CO2	--	--	--	3	--	--	--
CO3	--	--	--	2	3	--	--
CO4	--	--	--	--	--	--	2
CO5	--	--	--	--	--	3	--

1.Slightly 2. Moderately 3. Substantially

Detailed Syllabus:

UNIT–I:

Introduction: Definition – Classification and characteristics of Composite materials. Advantages and application of composites. Functional requirements of reinforcement and matrix. Effect of reinforcement (size, shape, distribution, volume fraction) on overall composite performance.

UNIT – II:

Reinforcements: Preparation-layup, curing, properties and applications of glass fibers, carbon fibers, Kevlar fibers and Boron fibers. Properties and applications of whiskers, particle reinforcements. Mechanical Behavior of composites: Rule of mixtures, Inverse rule of mixtures. Isostrain and Isostress conditions.

Unit III:

Introduction and Overview of the Strategic Cost Management Process, Cost concepts in decision-making; Relevant cost, Differential cost, Incremental cost and Opportunity cost. Objectives of a Costing System; Inventory valuation; Creation of a Database for operational control; Provision of data for Decision-Making.

Unit IV:

Project: meaning, Different types, why to manage, cost overruns centres, various stages of project execution: conception to commissioning. Project execution as conglomeration of technical and nontechnical activities. Detailed Engineering activities. Pre project execution main clearances and documents Project team: Role of each member. Importance Project site: Data required with significance. Project contracts. Types and contents. Project execution Project cost control. Bar charts and Network diagram. Project commissioning: mechanical and process

Unit V:

Quantitative techniques for cost management, Linear Programming, PERT/CPM, Transportation problems, Assignment problems, Simulation, Learning Curve Theory.

TEXT BOOKS

1. Material Science and Technology – Vol 13 – Composites by R.W.Cahn – VCH, West Germany.

2.Materials Science and Engineering, An introduction. WD Callister, Jr., Adapted by R. Balasubramaniam, John Wiley & Sons, NY, Indian edition,2007

3.Cost Accounting A Managerial Emphasis, Prentice Hall of India, NewDelhi

4. Charles T. Horngren and George Foster, Advanced Management Accounting

REFERENCES:

1.Composite Materials –K.K.Chawla.
2. Composite Materials Science and Applications – Deborah D.L.Chung.
3. Composite Materials Design and Applications – Danial Gay, Suong V. Hoa, and Stephen W. Tasi.
4. Robert S Kaplan Anthony A. Alkinson, Management & CostAccounting
5. Ashish K. Bhattacharya, Principles & Practices of Cost Accounting A. H. Wheelerpublisher

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	M.Tech.II Year (III Semster)			
Course Code	**ENERGY MANAGEMENT (Open Elective)**				
Teaching	Total contact hours - 45	L	T	P	C
Prerequisite(s): MEFA, Mathematics		3	0	0	3

Syllabus:

UNIT -I

ENERGY SCENARIO: Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

UNIT –II

BASICS OF ENERGY AND ITS VARIOUS FORMS: Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT –III

ENERGY MANAGEMENT & AUDIT: Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs, bench marking, energy performance, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments. Material and Energy balance: Facility as an energy system, methods for preparing process flow, material and energy balance diagrams.

UNIT-IV

ENERGY EFFICIENCY IN ELECTRICAL SYSTEMS: Electrical system: Electricity billing, electrical load management and maximum demand control, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

University Nominee
(Dr.Y.Srinivasa Kishore Babu)

Subject Expert
(Dr.N.Viswanathan)

Subject Expert
(Dr.B.Ravi Kumar)

Internal Member
(Mr.T.Amar Kiran)

Internal Member
(Mrs B Kavya Santhoshi)

Internal Member
(Mr V Suresh)

Chairman-BOS
(Dr.D.Ravi Kishore)

UNIT-V

ENERGY EFFICIENT TECHNOLOGIES IN ELECTRICAL SYSTEMS: Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.

Text/Reference Books:

1. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online).
2. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3, Electrical Utilities (available online).
3. S. C. Tripathy, "Utilization of Electrical Energy and Conservation", McGraw Hill, 1991. Success stories of Energy Conservation by BEE, New Delhi (www.bee-india.org).

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium] 3: Substantial[High], '-' : No Correlation)

	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	PO11	P012
C 01	✓								✓			
C 02			✓							✓		
C 03			✓									
C 04			✓									

University Nominee
(Dr.Y.Srinivasa Kishore Babu)

Subject Expert
(Dr.N.Viswanathan)

Subject Expert
(Dr.B.Ravi Kumar)

Internal Member
(Mr.T.Amar Kiran)

Internal Member
(Mrs B Kavya Santhoshi)

Internal Member
(Mr V Suresh)

Chairman-BOS
(Dr.D.Ravi Kishore)

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	II M.Tech (III semester)			
Course Code	**INTERNET OF THINGS AND APPLICATIONS**				
Teaching	Totalcontacthours-45	L	T	P	C
Prerequisites: Knowledge of Logic Gates, Relays, Registers, Counter, Sensors, Microprocessors, Microcontrollers, Serial & Parallel communication		3	-	-	3

Course Objectives:

1. To understand the basic concepts of Internet of things
2. To develop understanding with layered Wired and Wireless protocols.
3. To develop understanding with Arduino board and Arduino IDE.
4. To develop understanding with Data analytics and supporting services.
5. To develop understanding with Big data services and Sensors.

Course Outcomes:

On Completion of the course, the students will be able to	
CO1:	Learn the Architecture of iot,Sensors,Actuators,ARM processors.
CO2:	Learn the various Communication protocols present in a network.
CO3:	Apply the practical knowledge to Arduino board.
CO4:	Analyze the Machine learning and various network services.
CO5:	Learn the importance of Big data and Virtualization concepts.

Syllabus

UNIT –I

FUNDAMENTALS OF IOT: Evolution of Internet of Things, Enabling Technologies, IoT Architectures, oneM2M, IoT World Forum (IoTWF) and Alternative IoT models, Simplified IoT Architecture and Core IoT Functional Stack, Fog, Edge and Cloud in IoT, Functional blocks of an IoT ecosystem, Sensors, Actuators, & Smart Objects .IoT Platfortri overview: Overview of IoT supported Hardware platforms such as: ARM Cortex Processors, Arduino and Intel Galileo boards.

UNIT – II

IOT COMMUNICATION PROTOCOLS: Access Technologies: Physical and MAC layers, topology and Security of IEEE 802.15.4, 802.15.49, 802.15.4e, 802.11ah and Lora WAN, Network Layer: IP versions, Constrained Nodes and Constrained Networks, Application Transport Methods: Supervisory Control and Data Acquisition, Application Layer Protocols: CoAP and MQTT.

UNIT – III

DESIGN AND DEVELOPMENT ENVIRONMENT: Design Methodology, Embedded computing logic, Microcontroller, System on Chips, IoT system building blocks, Arduino, Nodemcu Board details, IDE programming.

UNIT –IV

DATA ANALYTICS AND SERVICES: Structured Vs Unstructured Data and Data in Motion Vs Data in Rest, Role of Machine Learning — No SQL Databases, Hadoop Ecosystem, Apache Kafka, Apache Spark, Edge Streaming Analytics, Xively Cloud for IoT, Python Web Application.

UNIT – V

CASE STUDIES / INDUSTRIAL APPLICATIONS: IoT applications in home, Agriculture 3.0, buildings, security, Industries, Home appliances, other IoT electronic equipments. Use of Big Data and Visualization in IoT.

Text Books:

1. IoT Fundamentals: Networking Technologies, Protocols arid Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press, 2017.

Reference Books:

1. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, Stamatis Karnouskos, DavidBoyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press, 2014.
2. Internet of Things with Arduino and Bolt by Ashwin Pajankar.

Web Links:

1. https://thingspeak.com
2. https://www.blynk.cc/getting-started
3. http://www.arduino.cc
4. https://coap.technology

CO-PO Mapping:

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) '-': No Correlation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	-	1	1	1	-	-	-	1	3
CO2	2	1	1	-	-	-	1	2	-	2	-	-
CO3	2	-	3	2	1	2	2	-	3	-	2	-
CO4	1	2	-	-	-	2	3	3	2	1	-	3
CO5	3	-	-	2	-	1	-	2	-	2	-	-

Regulation GRMT-20	Godavari Institute of Engineering & Technology (Autonomous)	I M.Tech III Sem.			
Course Code	**CYBER SECURITY**				
Teaching	Total contact hours-48	L	T	P	C
Prerequisite(s): Computer Networks		3	0	0	3

Course Objective(s)

- Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an Organization.
- Practice with an expertise in academics to design and implement security solutions.
- Understand key terms and concepts in Cryptography, Governance and Compliance.
- Develop cyber security strategies and policies
- Understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.

Course Outcomes

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

CO-1: Analyze and evaluate the cyber security needs of an organization.

CO-2: Determine and analyze software vulnerabilities and security solutions to reduce the risk of exploitation.

CO-3: Measure the performance and troubleshoot cyber security systems.

CO-4: Implement cyber security solutions and use of cyber security, information assurance, and cyber/computer forensics software/tools.

UNIT-1

Objective: Acquiring the basic knowledge on cyber-attacks and basic mechanisms.
Introduction: Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session security, Internet hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.

UNIT-2

Objective: Focuses on encryption algorithms and their functions.
Conventional Encryption: Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC

UNIT-3

Objective: Exposure on the number theory and cryptography algorithms.
Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, the Chinese Remainder theorem, discrete logarithms
Public key: Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service

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UNIT-4

Objective: Overview of internet protocol security and privacy.

IP Security: IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management

Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET)

Email Privacy: Pretty Good Privacy (PGP) and S/MIME.

UNIT-5

Objective: Overview of bugs and viruses firewalls.

Intrusion Detection: Intruders, Intrusion Detection systems, Password Management.

Malicious Software: Viruses and related threats & Countermeasures.

Fire walls: Firewall Design principles, Trusted Systems.

Text Books

1. Network Security & Cryptography: Principles and Practices, William Stallings, PEA, Sixth Edition.
2. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech

Reference Books

1. Network Security & Cryptography, Bernard Menezes, Cengage, 2010

CO-PO Mapping:

(1: Slight [Low]; 2: Moderate[Medium]; 3: Substantial[High]; '-' : No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-
CO3	-	2	-	-	-	3	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	-
CO5	-	-	-	-	3	-	-	-	-	-	-	-

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