"ഭരണഭാഷ- മാതൃഭാഷ"

കേരള സർക്കാർ

സംഗ്രഹം

ഉന്നത വിദ്യാഭ്യാസ വകുപ്പ് - സാങ്കേതികം - അക്കാദമികം - ഫൈബർ റീയിൻഫോഴ്സ്ഡ് പ്ലാസ്റ്റിക്സ് പ്രോസസ്സിംഗ് കോഴ്സിന്റെ പരിഷ്കരിച്ച പാഠ്യപദ്ധതി അംഗീകരിച്ചു ഉത്തരവ് പുറപ്പെടുവിക്കുന്നു .

ഉന്നത വിദ്യാഭ്യാസ (എൽ) വകുപ്പ്

സ.ഉ.(സാധാ) നം.506/2026/HEDN തീയതി,തിരുവനന്തപുരം, 28-04-2026

പരാമർശം:- സാങ്കേതിക വിദ്യാഭ്യാസ ഡയറക്ടറുടെ 07.03.2026 ലെ ഡി.ടി.ഇ.ടി.വി.എം/1182/2026-സി3 (എ.സി.എ) നമ്പർ കത്ത്.

ഉത്തരവ്

സാങ്കേതിക വിദ്യാഭ്യാസ വകുപ്പിനു കീഴിലെ തിരുവനന്തപുരം സെൻട്രൽ പോളിടെക്നിക് കോളേജിൽ നടത്തി വരുന്ന ഫൈബർ റീയിൻഫോഴ്സ്ഡ് പ്ലാസ്റ്റിക്സ് പ്രോസസ്സിംഗ് (FRP) ഒരു വർഷ സർട്ടിഫിക്കറ്റ് കോഴ്സിന്റെ പേര് കോംപോസിറ്റ് പ്രോസസിംഗ് & ഫൈബർ റീയിൻഫോഴ്സ്ഡ് പ്ലാസ്റ്റിക്സ് പ്രോസസ്സിംഗ് (COMPOSITE PROCESSING & FRP) എന്നു പുതുക്കിയും സാങ്കേതിക വിദ്യാഭ്യാസ ഡയറക്ടർ ലഭ്യമാക്കിയ അനുബന്ധമായി ചേർത്തിട്ടുള്ള പാഠ്യപദ്ധതി അംഗീകരിച്ചും ഉത്തരവ് പുറപ്പെടുവിക്കുന്നു.

(ഗവർണറുടെ ഉത്തരവിൻ പ്രകാരം)

രാജേഷ് എം

ജോയിന്റ് സെക്രട്ടറി

സാങ്കേതിക വിദ്യാഭ്യാസ ഡയറക്ടർ, തിരുവനന്തപുരം.

ജോയിന്റ് ഡയറക്ടർ, സ്റ്റേറ്റ് ഇൻസ്റ്റിറ്റ്യൂട്ട് ഓഫ് ടെക്നിക്കൽ ടീച്ചർ ടെയിനിംഗ് & റിസർച്ച് (SITTTR), കളമശേരി.

പ്രിൻസിപ്പൽ അക്കൗണ്ടന്റ് ജനറൽ (ആഡിറ്റ്/എ&ഇ), കേരളം, തിരുവനന്തപുരം.

വിവര പൊതുജനസമ്പർക്ക വകുപ്പ് (വെബ് & ന്യൂ മീഡിയ)

www.highereducation.kerala.gov.in

കരുതൽ ഫയൽ/ഓഫീസ് പകർപ്പ്.

ഉത്തരവിൻ പ്രകാരം

Signed by

Geetha Lekshmi. G

സെക്ഷൻ ഓഫീസർ

Date: 29-04-2026 10:00:05

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **Introduction to composites and its application**
Semester :	Credits:
Course Category:	
Periods per week: **3 (L: 5 T:1 P:0)**	Periods per year : **240**

Course Objectives:

- To explain about the fundamentals of composites
- To explain the different materials used in composite manufacture
- To explain the safety aspects

Course Prerequisites:

Topic	Program/Course Name
Basic knowledge in Materials Science / Manufacturing Processes	

Course Outcomes

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

COn	Description	Duration (Hours)	Cognitive Level
CO1	To know the fundamentals of Composites	60	
CO2	To know about Reinforcements and Matrices	60	
CO3	To study Safety, Environment & Waste Management	60	
CO4	To know Industrial Applications & Project Work	56	
	Series Test	4	

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**To know the Fundamentals of Composites**		
M1.01	To know History and evolution of composites, Natural composites (e.g., bone, wood, coconut tree)	20	Understand
M1.02	To study bout Constituents: Matrix (Polymer/Metal/Ceramic) & Reinforcement (Fibers, Particles)	20	Understand
M1.03	To study different types of composites: PMC, MMC, CMC, Advantages, limitations, and properties	20	Understand

Module 1:

History and evolution of composites, Natural composites (e.g., bone, wood, coconut tree)- Elaborate the features of each and its application

Constituents: Matrix (Polymer/Metal/Ceramic) & Reinforcement (Fibers, Particles)- Key Roles of Matrix and Reinforcement , types and its properties

Types of composites: Polymer Matrix Composites (PMC),Metal Matrix Composites (MMC),Ceramic Matrix Composites (CMC), its construction, properties , application, advantages and limitations,

CO2	**To know about Reinforcements and Matrices**		
M2.01	Study on Fibers: Glass (E, S), Carbon (PAN, pitch), Aramid, Natural fibers,	12	Understand
M2.02	Study on Resins: Thermosets (Epoxy, Vinyl Ester, Phenolic), Thermoplastics (PEEK, PP, Nylon)	12	Understand
M2.03	Study on Additives: Fillers, toughеners, catalysts, hardeners,	12	Understand
M2.04	To know about Prepreg and additives	12	Understand
M2.05	Study on Technical textiles: Weaving, Braiding, Knitting, Multidirectional preforms, etc.	12	Understand
	Series Test – I	2	

Module 2:

Fibers: Glass (E, S), Carbon (PAN, pitch), Aramid, Natural fibers : Types, properties, applications, advantages and disadvantages.

Resins: Thermosets (Epoxy, Vinyl Ester, Phenolic), Thermoplastics (PEEK, PP, Nylon)- Types, properties, applications, advantages and disadvantages.

Prepreg and additives – Definition, types, manufacturing method, function, application, curing, examples , Differences between prepreg and laminate,

Introduction to Technical textiles: Weaving, Braiding, Knitting, Multidirectional preforms, etc.- Definition, application of each type,

CO3	**To know Safety, Environment & Waste Management**		
M3.01	To know about Handling of chemicals and PPE usage	15	Understand
M3.02	Study on Fire safety and storage practices	15	Understand
M3.03	Study on Dust & fume control	15	Understand
M3.04	Study on Waste segregation & recycling	15	Understand

Module 3:

Handling chemicals and appropriate Personal Protective Equipment (PPE) usage: Types of PPE for chemical handling, Risk assessment, Training, Proper use, Maintenance.

Fire safety and storage practices: General Storage and housekeeping, Storage of flammable Materials, Fire safety equipment, Additional safety measures.

Dust & fume control: Key aspects of dust and fume control such as source capture, Local exhaust ventilation, Dust collection systems, Filtration ,Personal protective equipment (PPE), Compliance etc.

Waste segregation & recycling : Challenges in composite recycling, Waste segregation, Recycling Methods, Benefits of recycling.

CO4	**To know Industrial Applications & Project Work**		
M4.01	To carry Case studies from aerospace, automotive, wind energy, construction	56	Understand
	Series Test – II	2	

Module 4:

Case studies from aerospace, automotive, wind energy, construction : Different types of materials, different manufacturing methods, different types of testing, different types of designs used in industries.

Text /Reference:

T/R	Book Title / Author
R	**Composite processing, A practical hand book from design to Delivery** by Dr.P. Sasikumar
R	**An Introduction to Composite Materials** by D. Hull and T.W. Clyne:
R	**Composite Materials: Science and Engineering** by Krishan K. Chawla
R	**Introduction to Composite Materials Design** by Ever J. Barbero
R	**Fundamentals of Composite Processing: Materials, Methods and Applications** by Dr. Ashok Kumar M S

Online Resources

Sl. No	Website Link
1	https://onlinecourses.nptel.ac.in/noc24_me129/preview

Program : **Composite Processing and FRP**	F
Course Code :	Course Title: **Processing of Composites and quality control**
Semester :	Credits:
Course Category:	
Periods per week: **3 (L:5 T:1 P:0)**	Periods per semester: **240**

Course Objectives:

- To explain the fundamentals and applications of composite materials.
- To explain about the different materials used in composite manufacture
- To explain about the safety aspects

Course Prerequisites:

Topic	Program/Course Name
Basic knowledge of material science and manufacturing processes	

Course Outcomes

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

COn	Description	Duration (Hours)	Cognitive Level
CO1	To study Composite Manufacturing Processes – I	60	
CO2	To know Testing and Quality Control	60	
CO3	To study Composite Manufacturing Processes – II	60	
CO4	Study on Tooling, Fixtures & Assembly	56	
	Series Test	4	

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	To study composite manufacturing processes – I		
M1.01	To understand Hand lay-up and spray lay-up,	15	Understand
M1.02	To understand Vacuum bagging,	15	Understand
M1.03	To understand Compression moulding, RTM and VARTM	15	Understand
M1.03	To understand Prepreg handling & storage	15	Understand

Module 1:

Hand lay-up and spray lay-up, Process, Common Uses, Advantages Disadvantages

Vacuum bagging - detailed explanation of the process such as Lay-up ,Sealing, Vacuum Application, Pressure and Curing, Benefits of Vacuum Bagging

Compression molding, Resin Transfer Molding (RTM), and Vacuum-Assisted Resin Transfer Molding (VARTM) - Process , Materials , Advantages and Disadvantages

Prepreg handling & storage - Key Aspects of Prepreg Handling and Storage such as Temperature Controll, Moisture Protection , Original Packaging , Thawing , Handling Precautions , First-In, First-Out (FIFO) , Storage Environment

CO2	To study on Testing and Quality Control		
M2.01	To know Mechanical tests: Tensile, flexural, impact (ASTM standards),	20	Understand
M2.02	To know Thermal analysis: TGA, DSC	20	Understand
M2.03	To know NDT techniques: UT, Tap test, Shearography, Visual inspection, Alcohol wipe test	20	Understand
	Series Test – I	2	

Module 2:

Mechanical tests: Tensile, flexural, impact (ASTM standards)- Purpose, ASTM Standards, Key Properties Measured such as Tensile strength, yield strength, elongation, modulus of elasticity, Impact strength. Flexural strength, flexural modulus.

TGA (Thermogravimetric Analysis) and DSC (Differential Scanning Calorimetry)- Principle, Applications

NDT techniques: UT, Tap test, Shearography, Visual inspection, Alcohol wipe test – Working principles, Application, Advantages and disadvantages

CO3	To study Composite Manufacturing Processes – II

M3.01	To understand Filament winding and tape winding.	15	Understand
M3.02	To understand Pultrusion	15	Understand
M3.03	To understand Autoclave & Oven curing	15	Understand
M3.04	To understand CVI/CVD processes, Carbonization	15	Understand

Module 3:

Filament winding and tape winding – Process, Materials, Applications, Advantages and Disadvantages

Pultrusion - Process, Materials, Applications, Advantages and Disadvantages

Autoclave & Oven curing - – Process, Materials, Applications, Advantages and Disadvantages

CVI (Chemical Vapor Infiltration) and CVD (Chemical Vapor Deposition), Carbonization – Mechanism, Key Features such as pressure, Applications

CO4	**Study on Tooling, Fixtures & Assembly**		
M4.01	To understand Types of tooling: Metallic, composite	15	Understand
M4.02	Study on Fixtures: Bonding jigs, alignment tools	15	Understand
M4.03	To understand Joining methods: Bolted, bonded, hybrid	13	Understand
M4.03	To understand Surface preperation of metallic and composite	13	Understand
	Series Test – II	2	

Module 4:

Types of tooling: **Metallic, composite- Materials, Properties, Applications**

Fixtures: Bonding **jigs, alignment tools – Purpose and application**

Joining methods: **Bolted, bonded, hybrid – Basic principle, advantages and disadvantages**

Surface preperation **of metallic and composite - Surface Preparation Steps for such as** Disassembly, Stripping:, **Cleaning, Abrasion/Blasting, Final Cleaning, Chemical Treatment**

Text /Reference:

T/R	Book Title / Author
R	**Composite processing, A practical hand book from design to Delivery** by Dr.P. Sasikumar
R	**An Introduction to Composite Materials** by D. Hull and T.W. Clyne:
R	**Composite Materials: Science and Engineering** by Krishan K. Chawla
R	**Introduction to Composite Materials Design** by Ever J. Barbero
R	**Fundamentals of Composite Processing: Materials, Methods and Applications** by Dr. Ashok Kumar M S

Online Resources

Sl. No	Website Link
1	https://onlinecourses.nptel.ac.in/noc24_me129/preview

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **Raw Material and Consumable Lab**
Semester :	Credits:
Course Category:	
Periods per week: **3 (L: 0 T: 0 P: 3)**	Periods per Year: **120**

Course Objectives:

- To explain different materials used in composite processing
- To explain about selection of proper consumables for each operation
- To explain about sequences of layup.
- To explain bout various calculations about Density, Tax etc.

Course Prerequisites:

Topic	Program / Course name
Basic knowledge in workshop	

Course Outcomes:

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

COs	Description	Duration (Hours)	Cognitive Level
CO1	To understand Identification of Reinforcement Fibers , Resin Systems and Hardeners	30	
CO2	To understand about Composite Consumables	30	
CO3	To understand Reinforcement Weave Types	30	
CO4	To understand Estimation of Density, Tex, and GSM of a Laminate, & Fibre Volume Fraction Calculation	26	
Lab Exam		4	

urs● Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**To understand Identification of Reinforcement Fibers , Resin Systems and Hardeners**		
Ex 1	To identify and differentiate between various reinforcement fibers such as Carbon, Silica, E-glass, and Kevlar based on their physical and mechanical characteristics.	15	Apply
Ex2	To differentiate between thermoset and thermoplastic resins and understand the role of hardeners in curing processes.	15	Apply

dule 1:

- Examine the tex, appearance, and flexibility of each fiber.
- For yarns: **Tex = mass in grams / 1000 meters**
- Observe fiber under microscope (if available).
- Record differences in color, surface finish and texture,
- Find the breaking strength of the fabric.
- For fabrics: **GSM (g/m²) = (mass / area)**
- Examine resin samples (e.g. Thermoset and thermoplastic ,epoxy, polyester, PEEK).
- Observe mixing of resin and hardener, and note exothermic reaction.
- Discuss properties like pot life, curing time, viscosity, and application.
- Handle safely using gloves and mask.

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO2	**To understand about Composite Consumables**		
Ex 1	**To identify various consumables used in composite fabrication and understand their role in the process.**	30	Apply

Module 2:

- Observe and handle materials like Peel Ply, Release Film, Putty, Vacuum Bag, and Caul Plate, bleeder , breather.
- Note the material type, texture, and placement order in lay-up.
- Document the function of each consumable in laminate fabrication.
- Sketch a layer-wise setup of vacuum bagging stack.

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO3	**To understand Reinforcement Weave Types**		
Ex 1	To study and compare different reinforcement architectures such as Plain Weave, Twill Weave, Harness Satin, Preform, UD (Unidirectional) Fabric, Roving, and Filament.	26	Apply

Module 3:

- Observe weave patterns of fabric samples.
- Note fiber orientation, thickness, and areal weight (gsm).
- Discuss influence of weave on strength, flexibility, and resin flow.
- Sketch weave patterns or identify under magnifier.

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO4	**To understand Estimation of Density of a Laminate, & Fibre Volume Fraction Calculation**		
Ex 1	To calculate the density of a composite laminate and estimate fiber Tex and GSM values.	15	Apply
Ex 2	To estimate the fiber volume fraction in a composite laminate using given material densities and weights.	15	Apply

Module 4:

- Measure dimensions and weight of a laminate sample.
- Use formula: **Density = Mass / Volume**
- Use given values: fiber density (ρf), resin density (ρr), and laminate weight.
- Calculate volume of fibers using:

$$V_f = \frac{W_f/\rho_f}{(W_f/\rho_f + W_r/\rho_r)}$$

- Calculate fiber volume fraction (Vf).

Text / Reference

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R	**Composite processing, A practical hand book from design to Delivery** by Dr.P. Sasikumar
R	**An Introduction to Composite Materials** by D. Hull and T.W. Clyne:
R	**Composite Materials: Science and Engineering** by Krishan K. Chawla
R	**Introduction to Composite Materials Design** by Ever J. Barbero
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Online Resources

Sl. No	Website Link
1	https://onlinecourses.nptel.ac.in/noc24_me129/preview

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **Composite Processing Lab**
Semester :	Credits:
Course Category:	
Periods per week: **3 (L: 0 T: 0 P: 6)**	Periods per Year: **240**

Course Objectives:

- To explain about the different composite layup processes
- To explain about the safety aspects
- To demonstrate the testing methods

Course Prerequisites:

Topic	Program / Course name
Basic knowledge in workshop	

Course Outcomes:

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

COs	Description	Duration (Hours)	Cognitive Level
CO1	To understand about Resin Mixing and Pot Life Determination	60	
CO2	To practice Prepreg Hand Wetting with Resin, Basic Hand Layup with Prepreg Material	60	
CO3	To understand Vacuum Bagging and Leak Testing, Vacuum Assisted Resin Infusion (VARIM) with Room-Temperature Resin	60	
CO4	To study Personal Protective Equipment (PPE) Handling in Composites Lab, Manual Filament Winding of a Composite Tube	56	
	Lab Exam	4	

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**To understand about Resin Mixing and Pot Life Determination**		
Ex 1	To prepare and mix resin and hardener in the correct ratio and determine the pot life (usable working time) of the mixture.	60	Apply

Module 1:

- Take a known quantity of resin and mix with hardener in the manufacturer-recommended ratio.
- Stir slowly and thoroughly to avoid air entrapment.
- Start timer immediately after mixing.
- Periodically test viscosity or observe when it becomes unusable (gelling).
- Record **pot life** and discuss significance in layup operations.

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO2	**To practice Prepreg Hand Wetting with Resin, Basic Hand Layup with Prepreg Material**		
Ex 1	To manually wet a dry fiber prepreg with a controlled quantity of resin and ensure uniform impregnation.	30	Apply
Ex 2	To perform a basic hand layup using prepreg layers oriented in the required fiber direction.	30	Apply

Module 2:

- Cut dry fiber cloth to desired shape.
- Weigh and prepare resin mixture.
- Calculate required resin weight based on target fiber-to-resin ratio.
- Apply resin manually using brush or roller.
- Ensure even wetting without excess resin or dry spots.
- Cut prepreg to specific dimensions based on the layup plan.

- Orient fibers as per layup sequence (e.g., 0°, ±45°, 90°).
- Stack layers with careful alignment.
- Apply light pressure to ensure bonding.
- Record observations on layer consistency and prepreg tackiness.

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO3	**To understand Vacuum Bagging and Leak Testing, Vacuum Assisted Resin Infusion (VARIM) with Room-Temperature Resin**		
Ex 1	To assemble a complete vacuum bagging system and verify its leak-tightness.	30	Apply
Ex 2	To perform VARIM process for parts using RT-curable resin and observe resin flow behavior.	30	Apply

Module 3:

- Place laminate on mold and cover with peel ply, release film, breather cloth, and vacuum bag.
- Use sealant tape and connect vacuum hose.
- Pull vacuum and monitor gauge reading.
- Perform **leak test**: pinch hose, observe pressure drop (if any).
- Record vacuum level and time stability.
- Set up dry fabric over mold, with infusion mesh and vacuum bag.
- Connect resin inlet and vacuum outlet.
- Start vacuum and then open resin line to allow controlled infusion.
- Observe resin front and flow distribution.
- Allow curing at room temperature and record time taken.

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO4	**To study Personal Protective Equipment (PPE) Handling in Composites Lab, Manual Filament Winding of a Composite Tube**		
Ex 1	To understand and demonstrate proper usage of PPE in composite processing environments.	30	Apply
Ex 2	To perform filament winding by manually rotating a mandrel and applying resin-impregnated rovings..	30	Apply

Module 4:

- Identify PPE: gloves. goggles, lab coat, respirator mask, face shield.
- Handle resin, hardener, and solvents with PPE.
- Discuss disposal of contaminated PPE and emergency protocols (eye wash, fire extinguisher use).
- Set up rotating mandrel with handle or motor.
- Wet fiber rovings in resin bath.
- Wind fiber onto mandrel in helical pattern (angle of winding to be noted).
- Ensure even tension and coverage.
- Allow part to cure and demold after hardening.

Text / Reference

T/R	Book Title / Author
R	**Composite processing, A practical hand book from design to Delivery** by Dr.P. Sasikumar
R	**An Introduction to Composite Materials** by D. Hull and T.W. Clyne:
R	**Composite Materials: Science and Engineering** by Krishan K. Chawla
R	**Introduction to Composite Materials Design** by Ever J. Barbero
R	**Fundamentals of Composite Processing: Materials, Methods and Applications** by Dr. Ashok Kumar M S

Online Resources

Sl. No	Website Link
1	https://onlinecourses.nptel.ac.in/noc24_me129/preview

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **CAD Lab**
Semester :	Credits:
Course Category:	
Periods per week: **3 (L:0 T:0 P:3)**	Periods per semester: **120**

Course Objectives:

- To familiarize the different software used for drawing
- To Introduce the basic commands and tools necessary for two-dimensional and three dimensional drawing, design and drafting using AutoCAD

Course Prerequisites:

Topic	Course code	Course name	Semester
Basic knowledge about engineering drawing and Projections		**CAD Lab**	

Course Outcomes:

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

COn	Description	Duration (Hours)	Cognitive Level
CO1	Identify various commands used in CAD	30	
CO2	Apply knowledge to draw simple two-dimensional drawings and sections using CAD	30	
CO3	Draw various fastening devices by choosing proper tools in the software. Illustrate the concept of Limits, Fits ,Tolerances and representing surface roughness.	30	
CO4	Identify the basic concepts of 3D modeling in a software environment.	26	
	Lab Exam	4	

Course Outline:

On completion of the course student will be able to:

CO1	**Identify various commands used in CAD**		
Ex.1	Identify various commands used in CAD	10	Apply
Ex 2	Illustrate various coordinate systems	10	Apply
Ex 3	Identify the plotting parameters in CAD	10	Apply

Contents:

Draw and modifying commands: setting commands - limits of drawing, units, grid, snap, osnap, co-ordinates, ortho mode locating a point - absolute coordinate system - relative coordinate system - polar coordinate system - direct distance entry system. - simple exercises

Draw commands - line, circle, arc, ellipse, rectangle, polygon, spline, polyline, etc. Editing commands - erase, copy, array, rotate, mirror, offset, scale move, trim, fillet, chamfer, extend, stretch, p - line edit, explode, block, layers etc. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated Baseline, Continuous, Diameter, Radius and Angular Dimensions. Dim scale variable. Editing dimensions.

Text: Single line Text, Multiline text. - simple exercises

Standard sizes of sheet. Selecting Various plotting parameters such as Paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.

CO2	**Apply knowledge to draw simple two-dimensional drawings and sections using CAD**		
Ex 1	Draw various basic 2D entities using CAD.	10	Apply
Ex 2	Draw simple orthographic and sectional views of various components in CAD	10	Apply
Ex 3	Make use of commands to print/plot drawings prepared in CAD	10	Apply

Contents:

Working with CAD: Properties of lines – color, line weight, line type, layer properties Hatch and gradients.

Draw basic 2D entities like: Rectangle, Rhombus, and Polygon using AutoCAD. basic 2D entities like: Circles, Arcs, ellipse using AutoCAD. Draw basic 2D entities Circular and rectangular array using AutoCAD. Draw blocks of 2D entities compri Rectangle, Rhombus, Polygon, Circles, Arcs, circular and rectangular array, blocks AutoCAD. Developing orthographic and sectional views of simple components dimensions and text.

Exercises:

Orthographic views: Draw orthographic views of simple engineering objects lik block, Stepped block, Cylindrical block etc. (Draw minimum 5 figures)

Print/Plot the prepared drawings in CAD.

(Printout should be a part of progressive assessment).

CO3	**Draw various fastening devices by choosing proper tools in the software. Illustrate the concept of Limits, Fits,Tolerances and representing surface roughness.**		
Ex 1	Retrieve concepts of fastening devices.	10	Apply
Ex 2	Recall the use of various CAD tools.	5	Apply
Ex 3	Sketch a diagram using CAD tools.	5	Apply
Ex 4	Illustrate the concept of Limits, Fits Tolerances and representing surface roughness.	10	Apply

Contents:

Exercises in CAD drawing of the following

1) Drawing assembly of a bolt, nut and a plain washer (Hexagonal and Square headed),

Drawing rivet heads (general purpose) and riveted joints using standard proportions. Single riveted and double riveted lap joint (Chain and zigzag), single riveted single strap butt joint and single riveted double strap butt joint.

Concept of Limits, Fits and Tolerances. Geometrical tolerance – Dimensional tolerance – Systems of fits. Surface Roughness: Surface roughness terminology- surface roughness values, Grades and symbols. Symbols indicating surface texture

CO4	**Identify the basic concepts of 3D modeling in a software environment.**		
Ex 1	Identify the use of different 3D tools and commands	13	Apply
Ex 2	Prepare different 2D views of a 3D object	13	Apply

Contents:

Introduction 3D modeling- Constructing solid primitives-

Understanding UCS - viewing a 3D model - Boolean operations such as union - subtract - intersection.

Solid modeling – extrude – revolve – sweep

Draw simple solid objects by applying above 3D commands

Create sectional views of a 3D object

Create different 2D views (Orthogonal, Isometric) from 3D object using BASE tool in Layout tab.

Text / Reference:

T/R	Book Title/Author
T1	P I Varghese, K C John., Engineering Graphics, VIP Publishers
R1	N. D Bhatt. Engineering Drawing. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93- 80358-17-8.
R2	Kulkarni, D. M.; Rastogi, A. P.; Sarkar, A. K. Engineering Graphics with AutoCAD. PHI Learning Pri- vate Limited-New Delhi (2010); ISBN: 978-
R3	Jeyapoovan, T. Essentials of Engineering Drawing and Graphics using AutoCAD. Vikas Publishing HousePvt. Ltd, Noida, 2011; ISBN: 978-8125953005.
R4	Autodesk. AutoCAD User Guide. Autodesk Press, USA, 2015.
R5	Sham, Tickoo. AutoCAD 2016 for Engineers and Designers. Dreamtech Press; Galgotia Publication, New Delhi, 2015; ISBN 978-9351199113.

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **Basic Engineering Workshop**
Semester :	Credits:
Course Category:	
Periods per week: **3 (L: 0 T: 0 P: 3)**	Periods per Year: **120**

Course Objectives:

- To familiarize safety precautions practiced in the workplace.
- To prepare drawings models for fabrication.
- To identify various measuring, marking, holding, striking, and cutting tools & equipment.
- To prepare a drawing of models for fabrication.
- To operate machines, power tools, and equipment safely.

Course Prerequisites:

Topic	Course code	Course name	Semester
Trigonometry and other basic mathematics principles		Mathematics	
Geometric constructions and projections		Engineering Graphics	

Course Outcomes:

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

COn	Description	Duration (Hours)	Cognitive Level
CO1	Identify the safety precautions, tools and devices required to make carpentry joints	24	
CO2	Make use of various tools, machines, instruments and power tools used in the Fitting shop to make fitting joints	30	

CO3	Introduction, objectives, safety in the Foundry & Casting shop.	30	
CO4	Perform various operations on lathe/shaping machines	30	
	Lab Exam	6	

Course Outline

Module Outcomes	Description	Duration (Hours)	Cognitive Level
CO1	**Identify the safety precautions, tools and devices required to make carpentry joints**		
Ex 1	i) Explain safety precautions ii) Demonstrate various wood working Tools/equipment and power tools.	8	Understanding
Ex 2	Demonstrate various wood working process like Marking, Planning, Cutting, Chiseling, Grooving.	8	Applying
Ex 3	Construct a simple joint like open halved joint	8	Applying

Contents:
Awareness of safety measures :Personal safety, Machine safety and Job safety
Marking and measuring tools: Steel rule -Measuring tape-straight edge mitre square- try square- bevel square -combination square- marking knife marking gauge- mortise gauge- wing compass- divider- outside and inside calipers.
Cutting tools: Hand saw- Tenon saw-firmer chisel- bevel edge firmer chisel parting chisel- mortise chisel- jack plane- wooden and metal- trying plane smoothening plane- rebate plane- spoke shave.
Boring tools: Bradawl ratchet brace- wheel brace.
Striking tools: Mallet-Claw hammer.
Holding devices: Carpenters Bench vice-bench stop-sash clamp-G-clamp.
Miscellaneous tools: Rasp cut file- scraper-pincers-ratchet and screw drivers Oil stone- Saw set.
Power tools: Circular saw- Planer machine- Router- Portable Drilling machine Carpentry Practice: Measuring-Marking and Cutting practice- Planning practice-and Chiseling practice -Open halved joints (T joint/Cross halved Joint)

CO2	**Make use of various tools, machines, instruments and power tools used in the Fitting shop to make fitting joints**		
M2.01	i) Explain safety precautions ii) Demonstrate various tools, machines, instruments and power tools used in the Fitting shop.	10	Understanding

M2.02	Demonstrate various operations like Measuring, Marking, Cutting, and Filing.	10	Applying
M2.03	Construct a simple fitting joint involving measuring, Marking, Cutting and Filing.	10	Applying

Contents:
Hand tools & Marking tools: Scriber- compass- dividers- outside and inside caliper- jenny caliper –Vernier height gauge-ordinary scribing block- universal scribing block- angle plate- V-block- centre punch- prick punch- try square bevel square- surface plate.
Cutting tools: Hack saw -solid and adjustable frames – blades -chisels – flat crosscut- half round- diamond point- side chisel- Files – single cut and double cut files rough- bastard- second cut- smooth Dead smooth files – flat- square pillar- round triangular- half round- knife- safe edge and needle files.
Striking tools: Hammer-Ball peen- straight peen- cross peen.
Holding devices: Vice-bench- pipe- hand- pin and tool makers vice Power tools: Chop saw- Drilling machine.
Fitting Practice: Measuring- Marking and Cutting - filing- simple joints exercises(L joint /T joint/V joint)

CO3	Introduction, objectives, safety in the Carpentry shop, Foundry & Casting shop.		
M3.01	i) Explain safety precautions ii) Demonstrate various tools/equipment and protecting devices used in foundary	15	Understanding
M3.02	Demonstrate preparation of moulding sand & prepare moulds of different types using different patterns	15	Applying

Contents:
Hand tools – shovel- riddle- hammers- trowels- relic- lifters- strike off bar spruce- balloons- swab- gate
cutter- mallet- vent rod- draw spike- lifting plate- pouring weight- gaggers- clamps, core & chaplets.
Moulding practice & casting
Preparation of moulding sand- Prepare moulds of different types using different patterns(single, double
& three piece patterns)

CO4	Perform various operations on lathe/shaping machines		
M 4.01	i) Explain safety precautions ii) Demonstrate various tools/equipment used in workshop	10	Understanding
M 4.02	Lathe practice	10	Applying
M 4.03	Shaper Practice	10	Applying

Contents:
Lathe work -Familiarization with lathes- principal parts, work holding device, measuring instruments, accessories & attachments
Plain turning to the given accuracy - Practice with Precision measuring devices - use of digital vernier and Micrometer - Taper turning- Form turning (ball and curve)- Combination of above operations (taper, ball and curve)
Work on shaper
Familiarize with the parts, accessories and attachments.
Simple operations on Shaper (Planning)
Shaping of a rectangular block
Shaping a 'V' in a rectangular block

Text / Reference

T/R	Book Title / Author
T1	S.K.Hajara Chaudhary, Workshop Technology, Median Promoters and publishers, New Delhi 2015.
T2	J B Gupta Electrical Installation Estimation and Costing, Kataria, S. K., & Sons
R1	B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi 2014
R2	K. Venkat Reddy, Work Practice Manual, BS Publications, Hyderabad 2014
R3	Kents Mechanical Engineering Hand Books, John Wileynand sons, New York

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **Internship**
Semester :	Credits:
Course Category:	
Perio[redacted] 45 Days	

Course Objectives:

The objectives of internship training are to:

- Provide possible opportunities to learn and understand technical/supervisory skills required to be developed by the student as he advances the program.
- Expose current technological developments relevant to the subject area.
- Utilize experience gained from the 'Internship' in classroom discussions.
- Create conditions conducive to the quest for knowledge and its applicability on the job.
- Apply technical knowledge in real industrial situations.
- Expose students to the engineer's responsibilities and ethics.
- Promote academic, professional, and/or personal development.
- Promote self-learning

Course Outcomes

On completion of the course student will be able to:

COn	Description	Duration	Cognitive Level
CO1	Demonstrate the importance of teamwork in engineering.	45 days	Applying
CO2	Demonstrate sustainable engineering practices for the benefit of the society.		Applying
CO3	Demonstrate the ability of learning current technological trends.		Applying
CO4	Assimilate engineering responsibilities and professional ethics.		Applying

Course Outline:

The duration of internship shall be 45 working days during summer vacation

The following activities will be considered as Internship

- Inter/Intra Institutional/Industrial activities viz; Training with higher Institutions/industry
- Soft skill training organized by Training and Placement Cell of the respective institutions;
- Contribution at incubation/ innovation /entrepreneurship cell of the institute
- Participation in conferences/ workshops/ competitions etc
- Learning at Departmental Lab/Tinkering Lab/ Institutional workshop
- Working for consultancy/ research project within the institute/industry and
- Participation in all the activities of Institute's Innovation Council for eg: IPR workshop/Leadership Talks/ Idea/Design/ Innovation/ Business Completion/ Technical Expos etc.

Note

After completion of the Internship students should submit the report (in the prescribed format) duly signed by the officer in charge of the corresponding section. Student's eligibility criteria for writing the final examination will be cancelled if he/she failed to submit the Internship report.

Each student shall start her/his internship only after prior approval from respective HOD/Principal.

Program : **Composite Processing and FRP**	
Course Code :	Course Title: **Project & Seminar**
Semester :	Credits:
Course Category: **Major Project**	
Periods per week: **3**	Periods per semester: **120**

Course Objectives:

- To actualize talent, innovation, and skills of students
- To develop solutions/ and products of social significance applying technology.
- To promote entrepreneurial thinking.
- To develop skills in literature survey, technical presentation, paper preparation and public speaking.
- To enable the students to update with the latest topics in concerned discipline.
- To actualize talent, innovation, and skills of students
- To develop solutions/ and products of social significance applying technology.
- To promote entrepreneurial thinking.

Course Prerequisites:

Topic	Course code	Course name	Semester
Fabrication skills		Engineering Workshop	
Basics of relevant discipline			

Course Outcomes:

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

COn	Description	Duration (Hours)	Cognitive level
CO1	Apply technical knowledge in developing engineering products to simplify day to day conveniences.		
CO2	Demonstrate capability of self-education and clearly understand the value of achieving perfection		

	in project implementation & completion.		
CO3	Demonstrate the importance of teamwork and a multi-disciplinary approach.		
CO4	Demonstrate professionalism with ethics; present effective communication skills and relate engineering issues to broader societal context.		
CO5	Develop technical documentation and user manual of engineering products.		
CO6	Identify and analyze problems of the society and arrive at appropriate solutions.		
CO7	Demonstrate presentation skills.		
CO8	Develop technical paper using open-source tools		
CO 9	Ability to assimilate advancements in engineering technology/commercial practice/management		

Course Outline

Project:

The Major Project course shall include a problem statement, market study, finalizing the project, Project work implementation and preparation of Project report.

A problem statement of the problem/product/technology shall be prepared. The proposed project shall be identified for functionality, cost, safety etc..They shall perform the market study of the proposed project. Once the project idea is approved by the panel constituted by the HOD, the project work implementation shall be scheduled. Project report shall be prepared, using suitable documentation tools such as LaTex.

Seminar

Each student shall identify a topic of current relevance in his/her area of study(program), get approval of faculty concerned, collect sufficient literature on the topic, study it thoroughly, prepare own report in format specified and present in the class.

ANNEXURE I

RECOMMENDED LIST OF TRADES

I. ITI (All Mechanical related branches)

- Fitter:
- Turner:
- Machinist:
- Mechanic Motor Vehicle:
- Draughtsman Mechanical:
- Mechanic Refrigeration and Air Conditioning:
- Mechanic Mechatronics,
- Mechanic Machine Tool Maintenance,
- Mechanic Diesel,
- Mechanic Agriculture Machinery
- Additive Manufacturing Technician 3 D Printing
- Tool & Die Maker (Dies & Moulds)
- Tool & Die Maker (Press Tools, Jigs & Fixtures)
- Mechanic Machine Tool Maintenance
- Welder (Welding & Inspection)
- Welder
- Welder (GMAW & GTAW)
- Welder (Pipe)
- Sheet Metal Worker
- Plastic Processing Operator
- Foundry man
- Carpentry

2. THS (All Mechanical related branches)

- Fitting
- Turning
- Welding
- Automobile
- Electroplating

3. KGTE & KGCE (All Mechanical related branches)

- Mechanical Engineering:
- Production Engineering:
- Automobile Engineering:
- Mechatronics:
- Robotics
- Computer-aided design (CAD)
- Manufacturing.
- Refrigeration and Air Conditioning (RAC)
- Agro Machinery

4. B.Tech in Mechanical Engineering / Allied branches

5. Diploma in Mechanical Engineering / Allied branches

ANNEXURE 2

SCHEME OF EVALUATION

CURRICULUM REVISION 2025 - PROGRAMME SCHEME
PROGRAM NAME : COMPOSITE PROCESSING AND FRP
DURATION OF PROGRAMME: 1 YEAR

NO	Course name	Teaching Scheme				Evaluation scheme				Evaluation Mode
		Contact Hours/ week				CA	ESA	Total Marks	Exam Type	
		L	T	P	Total					
1	Introduction to composites and its applications	5	1	0	6	50	75	125	T	B
	Processing of composites and quality control	5	1	0	6	50	75	125	T	B
	Raw materials and consumables lab	0	0	3	3	75	50	125	P	B
	Composite processing lab	0	0	6	6	75	50	125	P	B
	CAD Lab	0	0	3	3	75	50	125	P	I
	Basic Engineering Workshop	0	0	3	3	75	50	125	P	I
	Internship	45 days				0	50	50	P	I
	Project and Seminar	0	0	3	3	0	125	125	P	I
	TOTL	10	2	18	30					

Continuous assessment mark spit up (Theory)

Subject	Attendance	Assignment	Series Examintion	Total
Introduction to composites and its applications	10	10	30	50
Processing of composites and quality control	10	10	30	50

Continuous assessment mark spit up (Practical)

Subject	Attendance	Record	Lab work	Lab Examintion	Total
aw materials and consumables lab	10	10	30	25	75
omposite processing lab	10	10	30	25	75
AD Lab	10	10	30	25	75
asic Engineering Workshop	10	10	30	25	75

Final mark split up (Internship)

Sl no.	Subject	Report	Exam conducted by corresponding section in the organiztion	Presentation and Exam conducted in the college	Total
1	Internship	10	20	30	50

Final mark split up (Project and Seminar)

Sl no.	Subject	Project (100)			Seminar (25)			Total
		Idea	Report	Work	Topic	Presenttion	Report	
1	Project and Seminar	10	30	60	5	10	10	125

ANNEXURE 3

EQUIPMENTS AND CONSUMABLES

Equipment List

No.	Equipment name	Specification	No.
1	Weigh Balance	Capacity: 3 Kg	1
2	Vacuum Pump	2-3 m3 / Hr	1
3	Blower	2 kW	1
4	Microscope	500 X - 1000 X	1
5	Vacuum Bag	10 m	1
6	Thermometer (Digital)	Range - 0 to 250 Degree C	1
7	Pick Glass	Range 0 - 10 mm	1
8	Thickness tester	Range 0- 2 mm	1
9	Vacuum Nipple		1
10	Rubber Hammer	12(0.75 lb)	1
11	Blade for putty, Chalk powder	24 inch	1
12	Scraper		1
13			

CONSUMABLE REQUIREMENT

Sl No	Items	Qty	Unit
1	Gp Resin 002	10	Kgs
2	Gelcoat Gp	10	Kgs
3	Catalyst MEKP	1	Kgs
4	Cobalt Accelator	1	Kgs
5	450 Matt Import	5	Kgs
6	Acetone	10	Kgs
7	Cotton Waste	3	Kgs
8	Pol. Pig Sig Red - R	1	Kgs
9	Pol. Pig Nile Blue - R	1	Kgs
10	Pol.Pig Gol Yellow - R	1	Kgs
11	Glouse (Rubber)	13	Pair
12	Poly vinyl acetate	10	Kgs
13	Wax	5	Kgs
14	Chalk powder (Dolomat powder)	5	Kgs
15	Water Paper 220, 320 or 400	10	Nos
16	Masking Tape	2 inch x 5	Nos
17	Sand Paper 65, 80	2 m x 3	Nos

Annexure 4
Question Model

CERTIFICATE EXAMINATION IN COMPOSITE PROCESSING & FRP

Subject Name

Time: 3 Hrs

Marks: 75

PART A (There should be minimum 5 questions from each module)

(Answer all Questions. Each question carries 1 mark)

1. –
2. –
3. –
4. –
5. –
6. –
7. –
8. –
9. –
10. –
11. –
12. –
13. –
14. –
15. –
16. –
17. –
18. –
19. –
20. –
21. –
22. –
23. -

PART B (There should be minimum two questions from each module)

(Answer any 8 full questions, Each question carries 3 mark)

1. –
2. –
3. –
4. –
5. –
6. –
7. –
8. –
9. –
10. -

PART C (There should be two questions from each module)

(Answer all questions, Each question carries 7 mark)

1. – (CO1)

Or

2. – (CO1)

3. - (CO2)

Or

4. - (CO2)

5. - (CO3)

Or

6. - (CO3)

7. - (CO4)

Or

8. - (CO4)